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MR. C. M. ROLKER, mining engineer, of this city, sails to-day for Honduras, on a professional trip that will involve an absence of about sixty days.

WE regret that we recently fell into an error that Americans only too frequently commit by their lavish use of titles. We know that many a deserving man, notably in the West, feels it as an insult when he is dubbed professor or doctor by the admiring but undiscriminating natives. They look upon these matters seriously abroad, and protest somewhat more vigorously than many do here when they are accorded a title to which they can lay no claim. We have been informed that in applying the title "Dr." to Mr. ROBERT HUNT, F.R.S., whose great book on English mining we reviewed some time since, we made a mistake that we hasten to correct. Mr. HUNT has no claim to a doctor's degree.

WE learn that on the 17th of last month a new basic Bessemer plant was successfully started at Friedrichshuette, near Morgenroth, Silesia. The plant consists of three ten-ton converters. Dr. WEDDING, in a work just issued on the basic process, states that there are now in Germany thirteen works, with 41 converters and a capacity of 369 tons, making the average nearly nine tons; in Austria, three works, with seven converters of 44 tons aggregate capacity; in England, six works, with 19 converters of 188 tons aggregate capacity; in France, five works, with 13 converters of 124 tons; in Belgium, two works, with two six and two ten-ton converters; in Russia, one works, with two ten-ton converters; and in this country, one works, with two ten-ton converters. In all, therefore, there are 31 works in the world, with no less than 85 converters, with an aggregate capacity of 795 tons, or the high average of more than nine tons per converter. For a young process, this is certainly a brilliant showing.

WE have been looking forward to some vigorous protest, by our pugnacious friends of New Jersey, against the free ore clause in the Cuban treaty, and must confess to great surprise that the Lake Superior mines should have seen fit to raise the cry. If the latter were wise, they would let their New Jersey and Pennsylvania brethren do the fighting and wrap themselves in a discreet silence. The pleas of the Eastern miners might arouse some sympathy, even among furnace-men, but the Lake Superior iron ore miners will find that there is very little kindly feeling for them anywhere. They have held the candle so high for so many years that very few of the furnace-men will yearn to help them. They claim to have invested eighty-five millions in the industry. Perhaps they have. But will they dare to show the other side of the ledger? It is quite generally believed that the profits of the copper mines would pale into insignificance in comparison with them. No one will deny them fair returns on their investment; but it is whispered that one hundred per cent per annum has not been an exceptional record with some of them.

THIS week witnessed a perfect carnival for the bears in coal stocks in Wall Street, and as their victories grew more pronounced, the horizon of the anthracite coal trade was shrouded in a deeper gloom. Day after day, the newspapers were full of startling stories of tremendous "cuts," and the public was cheered with the assurance of the early reduction of the price of coal to unprecedented figures. The Reading Company has long been represented as being on the war-path, and now the Lehigh Valley is said to be reaching out for scalps, with a fixed determination to have the privilege of supplying the elevated railroads with coal. We have not changed our opinions during all these stirring times. We insist that none of the interests can or will act independently. We are convinced that ultimately some fair adjustment will be reached on the basis of an allotment plan, which we have persistently urged for the past six months. The warlike spirit now so conspicuously displayed may, of course, degenerate into actual hostilities, which it may be difficult or impossible to allay; but thus far, the movements made have only the significance of being preliminary skirmishes for good positions.

UP to the hour of going to press, Judge LAWRENCE'S decision in the suit of the Lake copper companies against the Quincy Copper Mining Company had not been made. The latter company is accused of selling copper for shipment abroad in violation of an agreement that it entered into on the 14th of February, renewed August 20th until March 31st, 1886, with the Calumet & Hecla, Atlantic, Central, Allouez, Franklin, Pewabic, Huron, Conglomerate, and Copper Falls mines. Under this agreement, the Calumet & Hecla Company was to act as selling agent of the combination, the proceeds of sales to be distributed *pro rata* according to the quantity produced among the different members. The companies made a sale of copper abroad, and charge that the Quincy Company, in violation of its agreement, independently marketed a large quantity of copper in Europe. The only defense made, one that is curious, to say the least, in view of the past, is, that the combination is contrary to public policy.

It may have been years ago when the Lake companies practically controlled the market. Their absolute power was certainly shaken in 1882, and the last vestiges of control by any combination were lost during the current year. If, as a matter of convenience, the small Lake companies continue the arrangement in the future, that is a matter that is for them to decide. Some of them may still fondly cling to the fiction that they can realize better figures by co-operation—that they can thus control the market. But no careful observer of events during the past few years can fail to see clearly that, so long as we produce nearly double the quantity of copper that we can consume, and so long as that copper comes from widely distributed sources, there can be no effective control on the part of the majority of producers of one section. The combination has outlived its usefulness in the wide sense that it could obtain from consumers here a comparatively higher price than could be realized by free competition. Judge LAWRENCE may decide that the Quincy is

bound to keep its compact, and may make the present preliminary injunction permanent. That company may find it unpleasant to submit to the leadership of the Calumet & Hecla Company; but it will not probably, after the expiration of the contract, renew engagements that it has reason to believe are not advantageous to it. On the other hand, if the case is decided in favor of the recalcitrant company, an important addition is made to the list of those mines that have held aloof from the combination, among which the most prominent is the Osceola.

Whatever the result may be, few will regret the dissolution of the copper combination, which, as we have already stated, has outlived the days of its usefulness. Copper producers can only wish that the compact between the rolling-mills may share a similar fate.

THE climax in the copper trade appears to have been reached. Here, Lake copper has been sold, in one case under somewhat peculiar conditions, at 11¼ cents, and it is certainly procurable in any reasonable quantity at 11⅛ cents. Other brands may be quoted at 10½ to 10⅝ cents, and are practically unsalable at that for the present. Abroad, Chili Bars have sold down to £47 10s. under influences that look suspiciously like a strong bear movement. It is known that the Lake companies have sold abroad on the basis of Chili Bars, £4 added, and it is looked upon as probable that the purchasers, who are supposed to have bought on speculation, are making their purchases as cheap as possible.

These Lake sales for export have certainly been extraordinary. We are assured on good authority that the November shipments abroad, when Chili Bars ranged between £52 15s. and £50, netted the Lake companies here 11⅛ cents. Since then, Chili Bars have declined to nearly £47, equivalent to 10⅝ cents net here. The sharp disappointment to some of the Lake Superior mines that the low November return naturally brought with it was hightened by the fact that one of the mines acting independently placed one thousand tons of ingot abroad at £58, equivalent to very close on 12 cents. It was this sale that precipitated the little family quarrel among the Lake mines that has given the public a little insight into the operations of the pool, and has given rise to the usual amount of loose newspaper talk, to which we refer elsewhere.

It is certain that the European market has been loaded with a tremendously large quantity of American copper. In addition to the Lake sales, footing up to about 1000 tons a month, Montana has in the aggregate contracted for not less than 10,000 tons of matte. The Anaconda sale, which covers, we learn from the other side, four months' deliveries in 1884, or about 7000 tons, is known to be below 10s. per unit, because that offer was declined at first, and a lower one accepted later. This is about 7¼ cents per pound of copper at Butte. Other Montana producers are known to have done better, say from 8½ to 9 cents at Butte. Rio Tinto has contracted 500 tons of regulus per month for a year on the English market at private terms, or, as that significant phrase is usually interpreted, "exceptionally low figures." With Montana sending over about 1800 tons fine per month, and the Lake companies fully 1000 tons for the next months to come, it would seem that the metal is in a hopelessly bad condition. It would, however, be rash to rush to this conclusion. We have not until now believed that the pressure of low prices would curtail production in any of the leading mining districts of the world. We are convinced, however, that the point is now reached when it ceases to be a matter of choice, and we look for an early curtailment of the output in Chili, Australia, and Europe, and for the closing down of a number of mines in this country. On Lake Superior, the losses of the smaller mines must be very heavy, and the best thing they can do is to close down. In Arizona, the movement has already begun by the contemplated early cessation of one prosperous concern, whose managers simply decline to exhaust their mine without an adequate return for their investment. Others, we trust, will follow this wise example. In Montana, only the large concerns and those that have some silver to fall back upon can survive, and it would probably be better if even they would consent to some organized movement to reduce production. There is little or no money in from 7¼ to 7½ cents for copper on the spot, especially where works are poorly planned, as they are at least in one case. The Montana producers must and probably will seek some relief by the lowering of wages; but even this will not help those mines that have no works of their own.

We must, therefore, urgently repeat the advice tendered some time since, when 12 cents for Lake and 11 cents for other brands was looked upon as the probable bottom figure. Its justice is simply made more emphatic now by the fact that 11 cents for Lake and 10 cents for Western has become the limit as the highest cost of production that any mine in the United States should allow in deciding whether or not it will pay to go on.

AUSTRALIAN DIAMONDS.—At Bingera, New South Wales, the new diamond locality, the Australian Diamond Mining Company washed 279 loads, and got 920 diamonds, weighing 197 carats.

CORRESPONDENCE.

[Communications will be noticed only when accompanied with the full name and address of the writer. Unless specially desired, only initials will be printed. We invite criticism and comment by the readers of the ENGINEERING AND MINING JOURNAL. Replies not intended for publication should be addressed to the Editor of the ENGINEERING AND MINING JOURNAL in blank, stamped, and sealed envelopes. We do not hold ourselves responsible for the opinions of our correspondents.]

Arizona Copper and Chili Bars.

EDITOR ENGINEERING AND MINING JOURNAL:

SIR: We have carefully perused the interesting letter of S. R. in your issue of November 22d, but do not quite agree as to the profit now realizable by the Arizona mines.

Your correspondent overlooks the important fact that the Lake companies sell refined ingot copper, which, owing to its specially fine quality, realizes the highest price obtainable in the market; while the produce of the Arizona companies is of a similar nature to Chili Bars, and only sells in competition thereto.

Taking, therefore, 12 cents as the present value of Lake ingot, the value of Arizona bars would be about 10½ cents a pound—a figure that must come perilously near to the cost of production. Yours obediently,

LONDON, Dec. 4, 1883. JAMES & SHAKSPEARE.

[Messrs. James & Shakspeare, we fear, have not quite understood our correspondent, or they are laboring under a mistake in supposing that the product of the Arizona companies is marketed in the same manner that Chili Bars are sold in England. The bulk of the copper produced in Arizona is, it is true, about 97 per cent fine as it comes from the furnaces, and it is shipped from Arizona in that form. But only a small quantity, comparatively speaking, is marketed as bars, probably not more than ten per cent of the total output. The remainder goes to refiners here, who turn it out as ingot, in which shape it reaches the market. When Arizona copper is quoted here, refined ingot is referred to, which is practically equivalent in quality to, and sometimes higher in quality than, Best Selected. Some brands are exceptionally pure, and are pronounced by consumers to be equal to Lake for purposes exacting the highest grades of raw material. The apparent large difference between the quotations of Lake and Arizona is due to the fact that, for long periods, those of the former are practically nominal, or are the price that can be realized in small lots placed in the market by some of the Lake companies that are not members of the combination, or by manufacturers who are selling Lake copper contracted for, but replaced by other cheaper brands. Practically, the sellers of Arizona copper have led the decline, and the successive drops in the quotations of Lake were simply the effect. We may state that the best brands of Arizona copper command one half cent less than Lake, and the others from that price down to one cent less. These differences, we take it, are not the measure of the comparative quality of Lake and different brands of Arizona copper, but they reflect what is to some extent undoubtedly the prejudice on the part of our consumers in favor of Lake copper, which is the natural outgrowth of many years of constant use. These differences, furthermore, are in a degree the result of the greater eagerness of sellers of Arizona copper to place their metal, because of their lack of confidence during the past two years in the future of the market. They have undoubtedly fared well in following this policy of selling as fast as possible; and if they have made sacrifices, they are what every seller of new brands must submit to. We expect to see these differences grow smaller in the future, when no exceptional conditions distort the question as to the comparative intrinsic value of the different grades.

Our correspondent, S. R., when he referred to the cost of producing Arizona copper, included in his figures the cost of refining, and his estimates are based, therefore, on refined copper laid down in New York, general expenses, etc., paid.

Arizona bars, as we have already stated, have sold abroad, and the fact that they are better as bars than Chili bars has been recognized by the fact that the price realized for them has been about three quarters of a pound sterling higher than the Chili bars were quoted at at the time the sales were made.—EDITOR ENGINEERING AND MINING JOURNAL.

DRIFT MINING OF CALIFORNIA.*

By R. L. Dunn, M.E.

Out of the peculiar conditions of situation of the auriferous gravels of California, has been developed the method of mining generally termed "drift mining." Owing probably to its exclusive localization in California, and its comparatively slow development as one of the leading branches of the gold mining industry of the State, is due the absence of much definite published information concerning the practical detail of its operation. Also has it been to a less extent than any other branch of mining the subject of study and scientific investigation by trained mining engineers. The practically complete cessation of hydraulic mining resulting from the adverse decision of the courts in the "*Débris* suits," has brought drift mining more prominently into attention and consideration by gravel mine owners, as being the only possible method by which to work their claims. Many extensive and important mines are now operated by its methods, and a great extension of the industry is promised in the immediate future by the opening and development of as yet untouched ground. In this article, I have taken the experience of the practical working of many of the old and successfully operated mines, and from it have made such general deductions as will be of assistance in the exploration and development of new claims.

The drift mining districts of California comprise practically the entire areas in the State containing the unworked-out gold placers, and are part of the western slope of the Sierras included within the counties from Mariposa on the south, Shasta and Siskiyou on the north. It is in Nevada, Placer, and Sierra counties that the most extensive areas of mining ground are found, and also the most important mines at present worked. Plumas, Butte, El Dorado, Amador, Calaveras, and Tuolumne counties have also considerable areas of mining ground and important mines.

* From the *Report of the Director of the Mint upon the Production of the Precious Metals in the United States during the Calendar Year*, 1883.

The geological character of this entire district is uniform through its entire extent. The main axis of the Sierras and including the western slope to a distance of from 10 to 30 miles from the summit is granite. From the western edge of the granite and overlying it from thence, and extending to and disappearing under the alluvial plains of the valley, is an immense body of metamorphic stratified rocks. Of these, slate forms by far the larger part, limestone being the next most important. In a large area of western Placer, Nevada, and El Dorado counties, granite appears at the surface and is the country-rock. The age of the slates and limestones, so far as determination has been made from the rare fossils found, seems to be Jurassic and Triassic. In the granite and slate in the vicinity of the line of separation of the two formations, and in the slates in certain defined belts, are large numbers of auriferous quartz veins constituting the present quartz mines of the State, and, by their erosion in the geological epochs, the source of the gold found in the placers. This erosion, or rather the first of the two or three erosions this country has been subjected to, occurred in the Tertiary era, extending into if not through the Pliocene period. The evidence of this erosion consists of fragments of the old river channels of that time, which will be more particularly described farther on. The general topography of the country must have been rough, but hilly rather than mountainous. The river depressions do not seem to have been deep precipitous gorges and cañons, as at present, but apparently the streams ran in beds very near the general level of the country. These ancient rivers were, judging from the disconnected fragments of their channels that have been explored in mining, comparatively short streams, but, in some instances, of great width and carrying large bodies of water.

In some localities, two distinct sets of ancient river channels have been found, one cutting across the other, and so differing in every essential characteristic that they were undoubtedly formed during widely separated periods of time. All of these old stream channels necessarily became more or less filled with the *detritus* of their erosion. In some, the *débris* consists almost exclusively of quartz, boulders, gravel, and sand; others, again, are marked by almost an entire absence of quartz, its place being taken by granite, slate, and lava, gravels, sands, and clays. In nearly all of these gravel-filled channels, was gold, gathered from the eroded auriferous quartz veins and seams. This, briefly stated, was the physical condition of this country during the Pliocene period and until a great lava flow swept over the surface and covered it from one or two hundred to as many thousand feet deep. This lava flow followed and became, of course, deepest in the channel depressions, but was still deep enough to cover nearly all the elevations as well. It closed the period of the old physical conditions and topography of the country, and was the commencement from which this present topography dates. The present streams, principal among which, as draining the largest and most important part of the mining area, are the Feather, Yuba, and American, with their respective forks and branches, have gradually eroded tremendous cañons, in which they run one, two, and even three thousand feet below the summits of their precipitous sides. Their general course, more particularly in the region of the lava-covered old river channels, is, if any thing, more westerly than the latter, though this is by no means invariable, the direct reverse of this being true in some localities, and in others the courses being parallel. The erosion cut away first the lava, then the gravel drift in the buried channels, and finally far into the hard slates. The gold eroded out of the old channels, and some from the direct erosion of quartz veins, enriched the ravines, river beds, and bars, making the rich placers from which immense sums were taken during the early years of the California gold mining. These were long since practically exhausted and abandoned, and the source of the placer gold at present taken out and still valuable for the mining of future years is to be found in the fragments of the old river channels and drift left by the erosion of the present rivers lava-buried in the high divides or mountain spurs between the extremes. These divides are from a few hundred yards to several miles in width, comparatively level, except for a light upward grade toward the main mountain axis. The small tributaries of the rivers run on these divides in shallow depressions on easy grades until they reach the precipitous cañon sides, down which they plunge in cascades and water-falls.

The genesis and history of the deep placers, as they are sometimes termed, have been given in this article at considerable length, as in them are much general data that can be practically applied in mining them. The original discovery of the deep placers of the ancient river system occurred in the working of the ravines and gulches by the early miners. They kept prospecting and working up higher on the mountain sides in search of the source of the gold, and finally reached points beyond which it was impossible to find any traces of it on the surface. At these points, they found the auriferous gravel going into the mountain, and by means of short tunnels run following the pay (as it is termed) on the surface of the bed-rock, they mined it. It was, however, soon discovered that, in going into the mountain, the bed-rock, instead of rising, that is, keeping on an ascending grade, pitched away from the face of the mountain, that is, on a descending grade inward, and as a consequence, the influx of water into the working, having no natural drainage, soon became too large to admit of economical handling. Accordingly, to afford natural drainage and also to secure easier carriage for the gravel from the mine to the surface where it was washed, tunnels were run in the bed-rock on a light ascending grade and at such depths as it was supposed would leave it lower than the lowest point it was designed to work. From this time, drift mining became recognized as a distinct branch of placer mining. A more correct and extensive knowledge has gradually been acquired of the *locus* and peculiarities of the placers worked by its methods, though such is the conservatism of the miners of many of the districts that the results of experience are ignored in favor of the crude theories and methods of the earliest drift mining. The average drift miner who has been at it for twenty-five or thirty years in one locality is full of theories regarding the character and location of the channels. So much like the operation of chance has been the discovery of many of the richest mines that the miners are always hoping to make a lucky strike, and, looking at that, in many instances color their opinions by their wishes. As a result, in many instances of this blind dependence on chance for success in discovering a rich claim, hundreds of tunnels and shafts have been made that have proved a complete failure, and probably more money has been needlessly sunk than in quartz mining in the State.

Surface indications of the presence of an old channel are not always to be found. In case the channel runs directly or diagonally through the divide or mountain spur, at the points of ingress or egress gravel rich in gold is often found in large quantities, and this, with other indications in connection with it, is considered conclusive evidence as to the *locus* of the channel. More often, however, the channels run with the divide, and with entrances so far removed from the ground under examination that they can not be identified as connected with it, and would be useless if they could, in which instances there is no absolutely direct evidence of the existence of a channel, and it for the time being must be regarded as supposititious or reasonable from analogy. Often these latter-described channels are located so close to the front of the mountain that the ravines and gulches, while not cutting through them, have eroded so close as to remove some of the gravel and present the indications of a channel entrance. Some of the richest drift mines in the State have been located by tracing up these "break-outs," as they are termed.

If the surface of one of these divides be examined carefully, and surveyed and platted, showing the true contours and line of junction of the bed-rock and lava (or, as it is locally called, cement), the surface line of junction of the two formations will not align with contour lines on the surface, but will show considerable variations in relative altitude at different points, and it is this fact that makes it possible to approximate to the varying *locus* of the hidden channel, other conditions dependent on ascertainable data being favorable. The high bed-rock lying between the channel and the face of the hill on both sides is commonly referred to as being the "rims" or "rim rock" of the channel. Two channels in the same divide, which are of frequent occurrence, each having only the outer rim visible at the surface, complicate considerably the solution of the problem referred to above, and the approximate determination of the *locus* of the buried channel by engineering methods alone, and will often render it impossible. Suppose a number of cross-sections be made in lines parallel to a line of cross-section at supposed right angles to the line of the channel sought for, and at, say, 250 feet apart. In each of these that would cross at a point where in each of the channels both rims come to the surface, there would be given the horizontal distance between the point of intersection of the rims with the surface and their difference of level. With two more conditions given, the slope of the rims forward, and the width of the channels, its location in that particular section line could be exactly determined. As to the mean slope angle of the rims, it must be so taken for trial that on applying it in calculation it will locate the channel depression symmetrically between the rims. It is a matter of judgment of the engineer with reference to the ground that is under examination, and it is advisable to try maximum and minimum limits. The probable width of the channel can only be guessed to its most probable figure. A knowledge of the known channels of the locality is the safest guide. The highest maximum of mean slope should not exceed 30 degrees, and for width of channel not over 500 feet. Now, with the data already discussed, the horizontal distance from the surface point of the upper rim to the approximate center of the channel will be equal to one half the distance from the first-named point to the point in its plane at which the mean slope line passing through the lower rim surface point would strike, the slope angle being the same for both rims, and the difference of level between the plane of the upper rim point and the depression of the channel equal to the half distance referred to above into the tangent of the slope angle, diminished by one half the assumed width of the channel into the tangent of the slope angle. The graphical method is best suited for obtaining these quantities, no great degree of accuracy being required. The same rules being applied to the other cross-sections, a series of line and grade points will have been obtained, and by comparison an average can be obtained that will check out unconformable extremes, and will also determine points where only one rim is available. Having platted the presumed course and grade of the channel on the topographical map, the engineer can readily determine the points from which the channel can be prospected most thoroughly and economically, and if found to contain enough gold to pay for opening and working, the best available point for that purpose, making use of the additional and exact data acquired in the prospecting.

It will on first consideration seem that, using such inconstant factors and unknown variables as can only be had under the circumstances, it would be impossible to place any reliance on the results so obtained. Such, however, is not found to be the case in practice. The limits for error are usually easily determined, and it is very rarely that an extreme case similar to the hypothetical one considered in this article will occur. More or less underground work can be used to correct the theoretical determinations, and connections can be made with the underground works of adjoining claims that can be proved to be on the same channel, mean slope of rims, grade, and relative elevation of channel and surface.

The prospecting of the deep placers is done through small tunnels and drifts, either from the face of the mountain, or, where the overlying deposit is not too deep, from the bottom of small prospecting-shafts. Unless there is considerable water requiring to be handled, the latter are preferable, both as being more economical and testing a more extended area in the same length of time. Bore-holes sunk where the depth to bed-rock is too great for prospect-shafts are also employed successfully.

The permanent working of a drift mine is, wherever practicable, by means of tunnel, coming out of the mine from its lowest workings on a slight descending grade, as being by far the most economical. In some mines, it has been found advisable to operate through a shaft, but it is very costly to do so. So many different factors control the expense of mining the gravel, and at some mines the milling of it also, by reason of being cemented, that no general rule can be given. At some favored mines, the cost is only from $40 to $60 a 2-ton car-load; in other mines, it is from $400 to $600, and even higher for the same quantity.

The cost of opening a large drift mine and fitting it up for active operation is necessarily very large, and requires time. The main tunnel has often to be run 2000 or 3000 feet in hard bed-rock before the pay gravel is reached. Too much attention can not be given to the proper location of this main tunnel where of unavoidably great length. One hundred feet in length saved represents a large saving in cost. In this work, trained engineering skill should be employed. Though the service seems costly, yet properly applied it is in the outcome a great economy. Even the saving of a dollar a foot amounts to a large sum in the aggregate, and a

saving of $5 a foot is often possible by changing the line of the tunnel 10 feet to one side or the other.

If, on the one side, the expenses and risks of drift mining are large, so also are the returns of its successful operation liable to be very large. The gold yield of these deep placers is sometimes enormous. Single car-loads of gravel have been taken out that paid $11,000. Out of a half-acre of ground in one mine, $800,000 were taken out. Mines that have yielded bars are common; and yet, beyond all question, not one sixth of the area that can be worked profitably has been touched with a pick. The opportunity for investment of capital in and development of drift mines has never been as good as at present.

OVERHEAD TELEGRAPH WIRE.—II.*

By William Maver, Jr.

The term "hard-drawn" is derived as follows: Iron or copper intended for telegraph purposes is, while red-hot, put through rollers, which reduce the bars to a certain thickness. The rods or wire thus formed are then allowed to cool, when they are pulled through a die of the proper size by powerful machinery. Having run through this die, they may then be put through another die of smaller size, which reduces the diameter of the wire still more.

It is necessary that wire should undergo a special preparation for its passage through the die, which process consists in putting on a coating for anti-friction purposes. For instance, in starting with a wire rod, the first thing to be done, after it has been rolled to the desired size in the rolling-mill, is to clean off the oxide that has formed on the surface of the wire, by "pickling" in acid. If it were then attempted to draw the wire through a die, the two surfaces, that is, of the wire rod and the die, would come in contact with nothing between them, and the wire would be badly scratched, and the die quickly worn. Some lubricant is therefore rendered necessary, and oil alone is not sufficient, for the reason that, as the wire is passed through a hole smaller than itself, the oil would be crowded back, thus preventing the wire from being properly lubricated. It has consequently been found necessary to put a coating on the wire that would adhere to it while undergoing reduction in size. For this purpose, flour or lime coating, baked or dried upon the wire, is the most serviceable and the most frequently used.

It is almost impossible to draw wire of any considerable length that will have a uniform diameter throughout, but the discrepancy does not and should not vary more than the one thousandth of an inch in extreme cases.

The difficulty in drawing wire of exactly uniform size throughout its entire length is due both to the wearing of the die and the filling up of the die; that is, some kinds of metal, in certain conditions, "cut out" the die, or make the hole larger, while other kinds will "stop up" the die, thus making the wire larger or smaller as the case may be.

It is, I presume, understood that in this drawing process there is no waste of the metal of the wire, such, for instance, as would be caused by filing. The wire is actually drawn out thinner, so that there is, while the wire is running through the die, a ridge or wave of metal pushed back at the large end of the die; therefore, when a certain wire has been passed through a die, it is much longer than previously, but its weight is the same.

It is not quite plain why the copper wire now manufactured for telegraph lines should be so prominently put forward as "hard-drawn" copper wire, as the only kind of iron wire used for telegraph wire is hard-drawn. It has been stated that one reason for giving copper wire this distinctive title is, that an impression had prevailed for years that copper would not stand hard drawing; that in the process of so drawing, it continually broke, the cause of which would appear to have been that the copper thus experimented upon was an impure metal. There is some foundation for this statement in the fact that, within the past fifteen or twenty years, the specific conductivity of commercial copper has increased from about 85 to 98 and 99; 100 being the standard for pure copper wire.

Be that as it may, however, there is no question as to the present ability of all the principal wire manufacturing companies to produce a hard-drawn copper wire that will stand a breaking strain of from three to three and a half times its own weight per mile. In attaining this high degree of tensile strength, each company claims to do so by a process known only to itself, which process it claims to have arrived at after a great amount of experimenting, and consequently guards the secret very tenderly.

It has been conjectured by outsiders that a considerable portion of the secret of this process consists in the manner in which the metal is permitted to cool, it being known that the greatest degree of ductility, and consequently softness, is attained by suddenly cooling this metal by immersion in water. A gradual and systematic process of cooling while passing through the rollers would probably increase the hardness of the same metal.

AMERICAN AND RUSSIAN PETROLEUM.—The London Petroleum Association has refused the request of the agents of Russian firms to place the Russian product on the same footing as the American. The association has likewise refused to change the standard of test and color, which, it is alleged, is now in favor of America.

SMOKE-CONSUMING LOCOMOTIVE.—A smoke-burning locomotive, which has been tested on the Chicago & Northwestern and Chicago & Rock Island railroads has proved very successful. Though the poorest quality of bituminous coal was used, there was an absence both of black smoke and cinders. As the gases are all burned in this locomotive, there is a considerable saving of fuel. The smoke-stack, which is straight, is at the rear of the engine, and to reach it the smoke traverses forty feet instead of twelve, the usual distance, passing through an upper and lower set of flues. The heavy cinders and dust fall into a smoke-arch in front, and another arch in the rear catches the lighter particles of dust and ashes. Thus no cinders, sparks, or fire are thrown out, and the light, white smoke causes no annoyance.

*Electrical World.

CYLINDER ROASTING-FURNACE FOR LEAD ORES

The cylinder furnace has recently been taken up and adapted to lead smelting in a very ingenious manner by Mr. T. C. Huntington, manager of the large works of Messrs. G. Henfrey & Co., near Spezia, in Italy. These works are almost the largest of their kind in Europe, and are most excellently equipped in all respects for working lead-silver ores. The method of smelting is mainly that of calcination and agglomeration, followed by reduction in blast-furnaces. Mr. Huntington, though finding advantages in the use of the revolving cylinder, found it better to have cylinder and agglomerating furnace quite separate. It was also found that, with the cylinder fired at one end, as usual, satisfactory results were not obtained, as with many ores the temperature necessary to carry on active oxidation at the flue end was sufficient to sinter the ore at the fire end, preventing further efficient calcination and clogging the cylinder. After some experiments, the arrangement finally adopted by Mr. Huntington is as follows, as described by *Engineering:* The cylinders, some 15 feet long by a little under 5 feet wide, revolving in the ordinary manner on rollers, are placed horizontally, and are fired by producer gas. At each end, is an inlet for gas and for hot air, it being so arranged by means of reversing valves that the direction of the flame may be changed as desired in the ordinary regenerative furnaces. The charge of ore is fed into the cylinder from a hopper placed over it, and its calcination is watched through openings left for the purpose in the ends. When it is found that the ore is so hot at the fire end of the cylinder that the sintering may begin, the gas and air are reversed, and so the greatest heat removed to the cooler end, until that in turn becomes hot enough to require reversing to take place. In this manner, it has been found possible to carry on the oxidation of lead ore rich in silica, and particularly liable to sintering, without any difficulty, and to a degree of perfection not obtained in any of the ordinary forms of calcining furnaces. When a charge is finished, it is discharged through doors in the sides of the cylinder, as is done in the Brückner furnace, into a hopper-wagon placed below, the wagon being then raised by hydraulic lift to the top of the agglomerating furnace. The latter works continuously at a sufficiently high temperature to at once liquefy the ore, which comes to it thoroughly oxidized from the cylinders. Sulphate of lead, formed during calcination, is decomposed by the well-known action of the silica, the final product obtained being slag almost completely free from sulphur, and in excellent condition for the following treatment in the blast-furnace. The cylinders and agglomerating furnaces are placed close together, the waste heat from the latter being utilized in heating the air for the cylinders, by means of a "recuperator," built in a chamber at the flue end of the furnace, the air on its way to the cylinders passing through pipes or channels in the brick-work, which are heated from outside by the furnace gases passing away to the main flue, as in the recuperator of the Ponsard furnace. This supply of hot air to the cylinders very much diminishes the quantity of gas required for heating them, and materially assists calcination.

TABLE OF SIZES OF CHIMNEYS.*

By William Kent, of New York.

The accompanying table of sizes of chimneys for various horse-powers of boilers is based on the following data: 1. The draught power of the chimney varies as the square root of the height.

2. The retarding of the ascending gases by friction may be considered as equivalent to a diminution of the area of the chimney, or to a lining of the chimney by a layer of gas that has no velocity. The thickness of this lining is assumed to be two inches for all chimneys, or the diminution of area equal to the perimeter × two inches (neglecting the overlapping of the corners of the lining). Expressed algebraically, let D = diameter, A = area, E = effective area.

$$\text{For square chimneys, } E = D^2 - \frac{8D}{12} = A - \frac{2\sqrt{A}}{3}$$

$$\text{For round chimneys, } E = \pi\left(D^2 - \frac{8D}{12}\right) = A - 0{\cdot}592\ \sqrt{A}$$

For simplifying calculations, the coefficient of $\sqrt{A}$ may be taken as 0·6 for both square and round chimneys, and the formula becomes

$$E = A - 0{\cdot}6\ \sqrt{A}.$$

3. The power varies directly as this effective area E.

4. A chimney 80 feet high, 42 inches diameter, has been found to be sufficient to cause a rate of combustion of 120 pounds of coal per hour per square foot of area of chimney, or, if the grate area is to the chimney area as 8 to 1, a combustion of 15 pounds of coal per square foot of grate per hour. This is fair practice for a boiler of modern type, in which flues or tubes are of moderate diameter, gas passages circuitous, and heating surface extensive in proportion to rate of combustion, so as to cool the chimney gases to 400 or 500 degrees, and produce high economy.

5. A chimney should be proportioned so as to be capable of giving sufficient draught to cause the boiler to develop much more than its rated power, in case of emergencies, or to cause the combustion of 5 pounds of fuel per rated horse-power of boiler per hour.

Conditions 4 and 5 being assumed, the 80-foot by 42-inch chimney, 9·62 square feet area, will cause the combustion of 9·62 × 120 = 1154·4 pounds of coal per hour, or, at 5 pounds of coal per horse-power per hour, is rightly proportioned for 231 horse-power of boilers.

The power of the chimney varying directly as the effective area E, and as the square root of the hight h, the formula for horse-power of boiler for a given size of chimney will take the form:

$$\text{H.P.} = CE\sqrt{h}, \text{ in which } C \text{ is a constant.}$$

For the 80-foot by 42-inch chimney,

$$E = A - 0{\cdot}6\sqrt{A} = 7{\cdot}76 \text{ square feet.}$$

$$\sqrt{h} = 8{\cdot}944 \text{ square feet.}$$

Substituting these values in the formula, it becomes:

$$231 = C \times 7{\cdot}76 \times 8{\cdot}944,$$

whence $C = 3{\cdot}33$, and the formula for horse-power is

$$\text{H.P.} = 3{\cdot}33\ E\sqrt{h}, \text{ or, H.P.} = 3{\cdot}33\ (A - {\cdot}6\sqrt{A})\ \sqrt{h}.$$

*A paper read before the American Society of Mechanical Engineers.

SIZES OF CHIMNEYS FOR STEAM-BOILERS.

Formula, H.P. $= 3{\cdot}33\ (A - 0{\cdot}6\ \sqrt{A})\ \sqrt{h}$.

Diameter. inches.	Area A. Square feet.	Effective area. $E = A - 0{\cdot}6\ \sqrt{A}$. Square feet.	Hight of chimney. 50 ft.	60 ft.	70 ft.	80 ft.	90 ft.	100 ft.	110 ft.	125 ft.	150 ft.	175 ft.	200 ft.	Equivalent square chimney. Side of square $\sqrt{E} + 4$ inches.
			Commercial Horse-Power of Boilers.											
18	1·77	·97	23	25	27	.....	.....	.....	.....	.....	.....	.....	.....	16
21	2·41	1·47	35	38	41	.....	.....	.....	.....	.....	.....	.....	.....	19
24	3·14	2·08	49	54	58	62	.....	.....	.....	.....	.....	.....	.....	22
27	3·98	2·78	65	72	78	83	.....	.....	.....	.....	.....	.....	.....	24
30	4·91	3·58	84	92	100	107	113	.....	.....	.....	.....	.....	.....	27
33	5·94	4·48	.....	115	125	133	141	.....	.....	.....	.....	.....	.....	30
36	7·07	5·47	.....	141	152	163	173	182	.....	.....	.....	.....	.....	32
39	8·30	6·57	.....	.....	183	186	208	219	.....	.....	.....	.....	.....	35
42	9·62	7·76	.....	.....	216	231	255	258	271	.....	.....	.....	.....	38
48	12·57	10·44	.....	.....	....	311	330	348	365	389	.....	.....	.....	43
54	15·90	13·51	.....	.....	.....	.....	427	449	472	503	551	....	.....	48
60	19·64	16·98	.....	.....	.....	.....	536	565	593	632	692	748	.....	54
66	23·76	20·83	.....	.....	.....	.....	.....	694	728	776	849	918	981	59
72	28·27	25·08	.....	.....	.....	.....	.....	835	876	934	1023	1105	1181	64
78	33·18	29·73	.....	.....	.....	.....	.....	.....	1038	1107	1212	1310	1400	70
84	38·48	34·76	.....	.....	.....	.....	.....	.....	1214	1294	1418	1531	1637	75
90	44·18	40·19	.....	.....	.....	.....	.....	.....	.....	1496	1639	1770	1893	80
96	50·27	46·01	.....	.....	.....	.....	.....	.....	.....	.....	1876	2027	2167	86

If the horse-power of boiler is given, to find the size of chimney, the hight being assumed,

$$E = \frac{0{\cdot}3\ \text{H.P.}}{\sqrt{h}}$$

For round chimneys, diameter of chimney = diameter of $E + 4$ inches.

For square chimneys, side of chimney $= \sqrt{E} + 4$ inches.

In the formulæ and table, no account has been taken of the difference that is believed by some authorities to exist in the efficiencies of round and square chimneys of equal area, nor of the differences of friction and of rate of cooling of the gases in iron and in brick chimneys. Should experimental data of these differences, or of the effect of infiltration of air into brick chimneys, be obtained in future, the formulæ and table may be corrected accordingly.

GEOLOGICAL RELATIONS AND GENESIS OF THE SPECULAR IRON ORES OF SANTIAGO DE CUBA.*

By James P. Kimball.

For a distance of at least some twenty miles east of the longitude of the bay of Santiago de Cuba, the Sierra Maestra, or coast-range, maintains a hight of about 4240 feet, as barometrically measured by Mr. Emile Sarlabous, vice French Consul, at the point on its crest well known as Gran Piedra. On local maps of the Province of Santiago, this point is laid down as 5·69 miles from the coast of the Caribbean Sea, which is generally parallel with the crest of the range. The great outlier or escarpment of Gran Piedra, according to the same authority, presents the same lithological features as its lower foot-hills, namely, a coarsely crystalline syenite of eruptive origin. Wherever this has come under my own observation, within the expanse of the lower foot-hills, it is penetrated by very numerous dikes of diorite.

From the overflow of similar dikes, the upper immediate flank of the Sierra Maestra and middle foot-hills are covered with a mantle of the same trappean rock. The maximum thickness of this mantle I estimate to be about 2000 feet, corresponding to an altitude of about 3800 feet.

The Sierra Maestra is the south (front or coastward) range, and last elevated, as well as the longest, of a series of successively elevated ranges, together forming the broad belt of mountain plateau, stretching nearly to the north coast, and running out to a point at Cape Maysi. West of the bay of Santiago, a lower range, of still subsequent elevation, forms the coast range of the southern peninsula. This range is locally known as the Sierra de Cobre, although on general maps not distinguished from the Sierra Maestra.

Reference will presently be made to the more special lithological features of both ranges, within the limited scope of my observation. Occasion is here suggested to note, as a significant fact in relation to the vulcanism of the Sierra Maestra, the family relation of the two types of eruptive rocks entering into the structure of at least the base and south flank of this range. The significance of this fact, in connection with others that will be noticed, appears to be that the overweighting of the syenite mass along an inherent line of least resistance, corresponding to the margin of the sub-oceanic basin of the Caribbean Sea, has been followed, first, by depression, attended with re-melting of the base of the mass; and afterward by elevation. This elevation, it will be shown, has taken place by successive stages. The final if not the concurrent result of such oscillations of level has been to inject the molten magma, in the form of diorite, through fissures incidental to elevation.

The dioritic mantle thins off toward the coast, in part by erosion, while the lower ranges of foot-hills are completely denuded of diorite, if ever enveloped.

The immediate coast presents a remarkable development of coral rock, or coral limestone, in three terraces, of which the upper is about 350 feet above the sea. The second terrace is at an altitude of about 175 feet, and the present shore, a plateau of comparatively recent elevation, about 14 feet above tide. These terraces mark successive elevations of the Sierra Maestra range. These stages of elevation were in direct, but probably remote, succession with other elevations that I shall show to be indicated by traces of more ancient corallines (coral formations) about two miles still farther back from the present coast.

The last terrace, or that of the present shore, falls away vertically into deep water, soundings at the mouth of the Carpintero, 150 feet off shore, giving a depth of 165 feet. It retains to a remarkable degree the structure of solid reef, studded with distinct forms of coral, and is strewn with fragments of coral, rounded by the waves, but in good preservation, and numbering a large variety of species.

The two older terraces retain little or nothing of corallum structure, but are thoroughly consolidated, indurated, and crystalline. As an effect of the action of the waves in former periods, they still present mural escarpments seaward, with a *talus* at the base of each from weathering, and from clefts produced by the wedging effect of roots of trees.

The upper terrace reposes directly on the syenite, and east of the Carpintero River (Juraguacito) forms the immediate coast. The base of the two lower terraces is concealed.

The bay of Santiago corresponds to an original recession of the coast, the eastern limit of which was the mouth of the river just mentioned. This recession was once filled out with coral formation. Subsequent to the final elevation of the Sierra Maestra, the coralline was eroded into the present land-locked form of the bay, with the preservation of a wide margin of this calcareous rock. Both shores have been excavated from corallines, of which those already noticed are the more recent and easily distinguished. These present a bold front to the bay. The old Morra fortress is on the second and third terraces, numbered in inverse order of succession. Earlier corallines are less easily identified with what study I have been able to give to the region. The elevation of the Sierra de Cobre, the eastern end of which range faces the bay, seems to have resulted in the final elevation of the coralline area. The succeeding excavation of the bay has been effected with but little aid from existing streams, the present drainage of the mountain plateau of the Sierra Maestra and back ranges being to the east and west of it.

The bay of Guantanamo, 51 miles east and about three times the area of the bay of Santiago, possesses so many obvious points of resemblance to the latter, including littoral, topographical, and hydrographical relations, as to suggest in both cases also similar geological relations. Mr. Sarlabous informs me that the margin of the larger bay, like that of its twin, is of coral rock.

In the vicinity of Guantanamo Bay and thence eastward, the diorite mantle appears from the sea to envelop the crest and the whole southern flank of the Sierra down to the coast. Place is given to this remote observation, confirmed as it is by Mr. Sarlabous.

The Juragua Hills, so-called, are the culmination of the middle ranges of foot-hills of the Sierra, about half-way between the bays of Santiago and Guantanamo, or, more closely defined, between the mountain streams, the Carpintero (Juraguacito) and the Daiquri.

Along with a study of some very remarkable deposits of a specular ferric oxide, in course of development by the Juragua Iron Company (Limited), for consumption in Pennsylvania, these hills came under my observation in the months of June and July last.

As here distinguished, they consist of two parallel ranges of foot-hills distinct from the immediate south flank of the Sierra Maestra. The first or upper range reaches an elevation of about 2000 feet; the second or lower, of about 1100 feet.

Both ranges are the topographical result of the erosion of the south slope of the Sierra Maestra, within the compass of the diorite mantle down to the underlying syenite, and in the case of the lower range, well into the syenite. The syenite base of the upper range is occupied by the bed of the Carpintero, and that of the lower range by the Juragua and its east fork—the Benevolencia.

The lower contact of the diorite mantle with the syenite base of the Sierra (according, first, to unequal elevation, and, second, to subsequent unequal erosion) follows a convoluted line. This contact corresponds, as I believe, to parts of a former coast line, as shown by traces of ancient corallines. These traces are as follows:

1. Isolated bodies of marble without stratification, but with marked prismatic cleavage. These invariably occupy the elevated parts of the contact.

2. Isolated bosses and other bodies of specular and amorphous ferric oxide, only partially dehydrated, which I take to be replacements of ancient corallines. These occupy the lower parts of the contact.

Referring both occurrences to their original relations to the coast, they seem to be relics of bodies of coral rock and of coral reef reposing on the syenite. These masses became implicated in the igneous overflow, one or more than one, from the north. This is shown by the approximately east and west direction of the longer axes of them all. The upper ones, or those now occurring as marble, were probably of the nature of emerged

* *American Journal of Science.*

coralline, while those occurring as ferric oxide, lower in position and farther to the south, were probably of the nature of coral-reef when involved in the eruptive flood. These are found directly back of the lower contact, while the bodies of marble, in a similar relation to the contact, appear to be farther back of it.

The thinning of the diorite mantle toward the sea is thus seen to have been not altogether the result of its flow, slackening as may be supposed inversely to its mass, but to have been promoted by the extinguishing effect of the sea. The sea seems also to have brought the flow to a stop.

No traces of ancient coral reefs have been observed between the contact, within the area of the still lower syenite foot-hills, and the emerged corallines of the present coast margin. Yet such corallines may have once existed, and since disappeared by subaërial erosion.

Nor is proof afforded of any former extension of the diorite mantle below or south of the contact. Dioritic dikes, nevertheless, in great number, penetrate the syenite on every hand, their frequency becoming less toward the west, as distance increases from the culmination of the Juragua foot-hills. Beyond them, west of the Carpintero, but in line with the second range of foot-hills, or just back of the general course of the contact, the syenite hills have been wholly denuded of diorite, the hills themselves becoming gradually degraded toward the bay of Santiago, and exhibiting the extreme effects of weathering decay characteristic of highly crystalline feldspathic rocks in lower latitudes. Remnants of *detritus*, diorite, and hematite, upon the surface of these hills, attest the former extension of at least a thin development of the diorite mantle. Unlike the lower syenite hills of the Juragua group, these hills have not opposed to erosive agencies a great number of ribs or dikes of more enduring trappean rock.

In the absence of remnants of diorite in place, the presence of specular ore-float in place is equally significant. For all recognized ore-bodies and marble bodies are encompassed by diorite, or by products of its weathering, though limited to its lower margin—the ancient littoral, and in part submarine, relations of which are argued as above.

The interesting question now arises, whether the dioritic intrusions within what at the period of their vulcanism was a submarine syenitic area, below the level of the *habitat* of coral life, did not stop short of overflow. That such intrusions may have been limited in upward range by the submerged surface of the syenite seems indeed probable on general grounds. Hence the erosion of the lower syenite ranges of hills, three in number, of the Juragua group, may never have involved the disappearance of even a reduced thickness of the diorite mantle, as compared with its medium (if not minimum) original development immediately back of the present contact. The proposition then is, that the present syenite contact, as far as indicated, was the actual lower limit of the diorite mantle, as it is in fact at present. This I am inclined to believe.

The several terraces of recent coralline mark, as already indicated, successive, and in chronological order the later, uplifts of the Sierra, in vertical range not less than 500 feet. These, together with the series of corallines of the second line of foot-hills, as recognized by the bodies of hematite and marble, are proofs of a sum of uplifts of not less than 1300 feet. Obscure traces upon the first range of foot-hills of still more ancient corallines, to which I shall again refer, point to a still more remote succession of uplifts whose vertical range—referred to the latest indicated level of coral formations, some 100 feet below the present shore—may be estimated as about 2300 feet. From the syenite hills, may have disappeared by subaërial erosion intervening corallines, between those of the present coast and the line of ancient and now metamorphosed corallines traced along the contact or southern margin of the diorite mantle.

Dry beds of once powerful streams occupy deep defiles of the foot-hills, further attesting hydrographical changes of such a scope as may be believed to be commensurate with the degree of successive elevations of the Sierra. Such defiles are the arroyos Negro, Caridad, La Plata, and Berraco. The dry and nearly filled up Laguna of Berraco, so-called, some fifteen miles east of Santiago Bay, and a few feet above tide, corresponds to a former indentation of the coast at the mouths of what appear to have once been two of the largest streams of the south slope of the coast range.

The syenite of the lower foot-hills is weathered to a depth as far as yet penetrated by railroad cuts. All fresh surfaces thus exposed exhibit its disintegration along divisional planes, with the result of an obliteration of its prismatic structure from jointing. The incomplete exfoliation of prismatic blocks between joints has resulted in the usual rounding of the undecomposed centers in the form of cores. At the surface, where freed from their interstitial products of decay, these appear as outlying boulders. The weathering of the dioritic dikes that traverse the syenite in directions of least resistance corresponding to its jointing is indicated by the passage of their hornblende into epidote and chloritic residuums.

The diorite also presents toward its lower margin marked phenomena of weathering decay or of metasomatic alteration. These will presently be described as subsidiary results of the process of epigenesis, or course of permutations, by which the calcareous material of implicated bodies of corallines has been replaced by ferric oxide.

The weathering of the upper parts of the diorite mantle is less obvious. Yet, like all superficial masses of ancient (especially eruptive) basic rocks, it stands for a once more basic aggregate, from which protoxide bases have been largely eliminated in the form of sulphates and of alkaline bicarbonates. The epidotic character of much of the diorite where least obviously weathered is one of the proofs of the instability of the hornblende. Again, regarded as a feldspathic aggregate under conditions of extreme exposure to weathering action, all parts of the diorite must be assumed to represent its effect, however unequal, and insusceptible of measurement without the partial preservation of the original type for comparison. This consideration is one of importance in the present case, because a large source of ferric oxide must be looked for to account for its accumulation, under favorable circumstances of drainage, in the form of the iron ore-bosses along the lower edge of the diorite mantle, at its contact with the underlying syenite.

Two series of circumstances have determined the *loci* of these iron ore-bosses, namely (1), the *loci* on the ancient submarine slope of the syenite on which coral-reef was reared, or on which coral sediments were piled up by the waves; and (2) subsequent favorable conditions for the supply of ferric oxide to replace lime carbonate as fast as it dissolved under the intermittent action of percolating acidulated waters and of alkaline bicarbonates.

1. Proof of the coralline parentage of the iron ore-bosses is the preservation in nearly all of them of fossil corals, or at least of casts of coral. Such casts are found toward the outer parts of ore-bodies, in what may be called their transition parts. These are in general siliceous from the segregation of silicates. While the lime carbonate of the casts referred to is replaced by ferric oxide, the cells of the corallum are filled out with segregated matter, more or less chloritic from secondary alteration.

The larger bosses, corresponding to coralline masses, exhibit a concentric structure characteristic of segregation by foliation or external deposition. The smaller ones, on the other hand, frequently present the peculiar warped surfaces characteristic of the coral rocks, and such as may be seen on every cliff or detached mass of coral rock in the terraces along the present coast.

The larger bosses may in a general way be described as lenticular bodies, any section of which is approximately elliptical. The smaller ore-bodies are of irregular shape, and suggest a fragmentary relation to the larger ones, especially as they are always found near the larger, and invariably in such relations as would correspond to the superior surfaces of corallines referred to their original relations with their syenite base.

The position of all the ore-bodies is on the inner or upper side of the syenite contact, but laterally and terminally surrounded with altered dioritic rocks. This fact, together with the circumstance that their longer axes are approximately parallel with the crest of the Sierra as well as with the present coast, tends to show the parent corallines to have been involved in the igneous flood down the Sierra slope from the overflow of innumerable dikes. The implication of the corallines in the flood of eruptive was probably attended by elevation of the whole range, including the coast. Subsequent elevations have raised them higher, and further withdrawn the coast. Some of the ore-bodies are penetrated by courses of diorite, now sometimes represented by chloritic kaolin. These I am disposed to refer to ramifications of the eruptive material in the act of overflow and upheaval.

2. The ore-bodies, whose general position is thus to be defined, occupy the thinning edge of the diorite mantle. How far its reduced thickness is due to erosion, and how far to its original development, or to the circumstances of its flow, is partially indicated by the degree of erosion that the ore-bodies themselves have undergone. All that have been discovered have been more or less truncated by erosion.

The relation of the marginal region of the diorite mantle to the great body of the same basic formation back of it, and to the underlying syenite, and the preservation under conditions of energetic weathering of the syenite in hills in front, are circumstances readily recognized as favorable to metasomatic action along this margin. Underground as well as superficial drainage of both formations must have been directly toward this margin, especially before the present minor topography was sculptured. That the present topography has been wrought subsequently to the formation of the iron ore masses is clear from the fact of their erosion by the streams, which now follow in part the same marginal region of decayed and decaying rocks.

Unequal elevation or unequal erosion, or probably a combination of both conditions, has served to introduce a series of conditions unfavorable in certain cases to the radical alteration of coralline masses. In such cases, the coralline mass occurs in the form of white marble. In attitude and general relations both with the syenite and diorite, such masses have only certain features in common with the ore-bosses. They have already been described as devoid of stratification, and as strongly characterized by a prismatic cleavage. They all occupy positions in the Juragua Hills toward the summits of the second range, at the base of which the ore-bodies are distributed. Under such circumstances, all drainage both from the diorite and the syenite is and always has been away from them, and *pari passu* toward the iron ore-bodies. The incasing diorite exhibits no marked phenomena of weathering. The argument for the limited degree of weathering sustained by this rock under such conditions, it will be noted, is by induction. Replacement of calcareous matter has gone on only at the surface of such bodies, as shown by the prevalence of float of ferric oxide remarkably pure, but evidently from small plates or segregations on their sides. Garnetiferous aggregates with considerable proportions of specular and magnetic oxides of iron are the most common products of metasomatism met with on the diorite summits.

The marble ledges have, however, so many relations in common with the iron ore-bodies, the coralline parentage of which seems to me demonstrated, that they likewise must be referred to a similar primary origin. Their metamorphism or crystallization is due to igneous contact. Their preservation in the metamorphic state without metasomatic alteration, is explained as above by their obvious exclusion from the conditions that have governed the alteration into ferric oxide of other corallines, whose more favorable environment with reference to such an alteration I now proceed to describe.

Toward the continuous base of the second range of hills, the diorite margin, just back of the contact, has passed into miscellaneous aggregates of a chloritic type. Such are the rocks that immediately incase the ore-bodies. They are soft, rotten, and bleached. In color, they are of various light shades of green. By further oxidation of ferrous silicates, this coloration has locally given way to darker complexions of red and brown, especially in such as exhibit a notable proportion of free silica, and a dense amorphous consistency. Aggregates of clear crystalline quartz in admixture with magnetic oxide of iron likewise occur, apparently as residual forms of the alteration under local circumstances of basic material originally containing a notable proportion of this oxide.

The syenite conspicuously outcrops in contact with ore-bodies only in a single instance. This is the south ore-body of East Mine Hill. Here one side and both ends of the ore-boss abut upon the syenite, which thus forms a *cul-de-sac*. The contact upon the exposed side is occupied by two courses of rotten, aluminous, and bleached chlorite in a kaolinized state. These are succeeded by a plate of amorphous siliceous and highly ferriferous material, 3 feet in thickness, within the compass of the ore-body, and forming its outer wall. Irregular courses of chloritic and distinctly aluminous material correspond to outer shell-like divisions of the ore-body, due, as I suppose, to the exfoliation of siliceous (insoluble) matter in the process of molecular rearrangement of the mass in the process of segre-

gation and concentration of ferric oxide, attending its replacement of lime carbonate. A part of the siliceous matter thus exfoliated probably represents detrital contents of coralline masses; another part the alteration *in situ* of ramifications or tongues of dioritic eruptive material intruded into fractures of the original coralline mass when overwhelmed and lifted.

Courses of chloritic material of the above description incase the lower ends, at least, of all the ore-bosses wherever terminal parts have been uncovered by excavations. These conform to the general lenticular outline already referred to, and hence are to be referred, as above, to exfoliated insoluble residuums. They are similar in type to the intrusions of siliceous material within the compass of the ore-bodies. The decomposition of dike-like ramifications *in situ* is seen to result in a product indistinguishable from the residuums instanced from dioritic *detritus* in the parent coralline. This may be supposed to follow from the qualitative identity of such *detritus* with the diorite from which it was mainly derived.

The terminal parts of only the lower and more accessible ends of the ore-bodies have thus far been exposed by excavations at the base of the hills, and just back of the contact, where, in the course of its convolutions, this conforms to the southerly course of streams. The longer axes of the ore-bodies are therefore transverse to such parts of the beds of streams as have been eroded along the contact. Only where assuming a longitudinal direction, has the contact, for obvious reasons, presented to erosion the line of least resistance.

The chloritic courses immediately incasing the ore-bosses, and which have been described as exfoliated residuums, alternate with divisions of siliceous ferric oxide. Incomplete quaquaversal or rounded dips are thus observed at the lower terminal parts of ore-bodies. The concentric structure, of which they are the outer manifestation, prevails as far as can be seen within the interior of the less eroded ore-bosses where penetrated by drifts. Hence a divisional structure resembling that of an onion, and easily mistaken for bedding. The shell-like divisions, elsewhere described as transition parts of ore-bosses, give way inside to massive ore divisionally arranged as above instanced. The conditions of the central and nether parts of the larger ore-bosses have not yet been brought to light. The center of the south ore-boss of East Mine Hill appears to be not far away from its eroded surface. The ore is there presented in massive form and of extraordinary purity.

The larger ore-bodies present all the numerous physical types of specular oxide, besides a variety of phases from unequal distribution of pyrite and of magnetic and manganic oxides, and from an unequal degree of hydration. Earthy admixtures are of a chloritic and epidotc type, and thus essentially basic, differing in this respect from Huronian speculars whose earthy tendency is decidedly acid from segregations of quartz or from intercalations of jasper. As returned by numerous average proximate analyses from commercial samplings, exclusive of my own, moisture, in part hygroscopic, is constantly present in percentages of from 0·24 to 0·81; silica and insoluble, from 5 to 10¼; phosphorus, from 0·009 to 0·065; sulphur, from 0·045 to 0·248; and iron, from 61 to 68¼.

It is needless here to follow out what may be termed the circular processes of the epigenesis of ferric oxide from basic rocks through the mediation of meteoric waters charged with organic, sulphuric, and carbonic acids, and of its preservation under favorable conditions. The replacement of soluble lime carbonate by comparatively insoluble ferric hydrate in the act of peroxidation from ferrous carbonate and from ferrous sulphate, and its concentration under favorable conditions by segregation or as a sediment, as the case may be, are common and well-known phenomena.

The Clinton so-called fossil-ores of the Upper Silurian areas of the United States afford a familiar example of the replacement of limestone by ferric oxide. The Archæan specular ores of the James River of Virginia are an example of the segregation of ferric oxide from metamorphic schists *in situ*. Eruptive porphyries of Leadville, Colorado, have given origin to similar segregations. The gossans of almost every mineral vein further illustrate the familiar phenomena of epigenesis of ferric oxide. The Cuban iron ores, above described, differ from the Archæan schistose deposits of Michigan and Wisconsin, and from the bedded parts of the deposits of Pilot Knob and Iron Mountain of Missouri, in the following particulars: 1. They have had their immediate source in eruptive rocks rich in protoxide bases instead of metamorphic rocks comparatively poor in proto-silicates. 2. Their ferric oxide has been concentrated without ever reaching hydrographical channels of drainage, and therefore preserved almost *in situ* without the mediation of basins. 3. The basic character of their siliceous impurities, occurring as residuums, characterizes them still further from both classes of Archæan ores, especially from the schistose, whose accessory admixtures are not only acid but of the nature of segregations, intercalations, and mechanical sediments. These, in point of sizable development and, cursorily regarded, in general lithological appearance, are, however, their nearest familar analogue.

Besides the iron ore-bodies above described as *replacements*, another class of deposits of ferric oxide remains to be described. These may be distinguished as *concentrations*. These are partially altered dioritic masses characterized by a notable but unequal concentration of ferric oxide *in situ*. The outcropping portions of such masses are often no less rich in specular oxide than the ferric replacements of coralline, from which, however, they are readily distinguished by their superior hardness and density, and by their sharp metallic sound when struck with a hammer, as well as by the circumstances of their metasomatic association with unaltered or incompletely altered diorite.

What has determined the localization of such deposits within the diorite mantle has not been made clear. Certain indicated circumstances rather than well-ascertained facts, seem to bear upon this question. 1. The location of such deposits, as far as recognized, is near the contact, but not uniformly immediately back of it, as in the case of the ore-bodies of coralline parentage. Some relation between the two classes of deposits may be suspected from the fact that an occurrence of this kind is recognized alongside, and probably in contact with, the developed lenticular north ore-body of West Mine Hill; while alongside a similar trappean concentration in Dry Arroyo, farther up the same hill, the presence of lenticular ore-bodies of the nature of replacements is indicated.

Ferriferous parts of the diorite referred to are usually beneath the *detritus*, and may be considered as representing a state of weathering intermediate between the normal diorite and its bleached and obviously weathered products. Such occurrences are a conspicuous feature of the first range of foot-hills. On the Yuca mine location, what appear to be garnetiferous casts of corallum have been found in juxtaposition with an ore-deposit of this description. This is the only relic, if such it be, of the former existence of corallines discovered by me so far back as this range of foot-hills.

The question therefore arises, whether obscure and in some places obliterated corallines may not, under such circumstances, have given way to available replacements of which ferric oxide was but a minor part, and have determined the *loci* of such metasomatic activity or chemical permutations as to have resulted in the exchange of acids and bases in the basic and pyritiferous eruptive, followed by concentration of ferric oxide. The peroxidation of ferrous oxide *in situ* is easily conceived to have been a result from the tardy circulation, in so dense an aggregate, of chalybeate, or of solutions of the vitriolized products of iron and copper pyrites, especially under the further condition of an adjoining body of limestone. Calcic carbonate has also been at hand from decomposing silicates.

As a corroboration of the general induction, such occurrences may be held to attest an originally more basic constitution of the diorite, and especially a once larger proportion of ferrous oxide, and accordingly of proto-silicates. Minor exhibitions of the same general class, but clearly without the mediation of limestone, are outcropping surfaces of dioritic dikes, the identity of some of which seems to have been preserved within the compass of their general overflow, or, as above distinguished, the diorite mantle. The concentration of ferric and magnetic oxides upon such surfaces presents outliers popularly regarded as outcrops of ore-bodies of great richness. A few blasts are generally sufficient to prove their superficial character. Cupreous stains of green carbonate from the epigenesis of a sulphide of copper are found within the ore-bosses of coralline origin, as well as in the interior of ferriferous parts of the diorite.

The copper deposits of the Sierra de Cobre west of the Bay of Santiago exhibit to a remarkable degree still active metasomatism of the dioritic porphyry in which they occur. Not only is the overflow of mine-water from the abandoned mines a present source of cement-copper, but exfoliations more or less cupreous are observed on all weathered surfaces of wall-rock left standing by the old English companies. Even individual fragments of diorite *detritus* in the old burrows have become completely coated with exfoliated mineral matter. Ferric as well as miscellaneous cupreous products thus occur, along with a variety of silicates and other insoluble compounds. Even the old slags show zeolitic and other drusy segregations. Secular phenomena of this kind may be considered as in part an effect of the humidity and high mean average temperature of the climate.

Under the same favorable climatic conditions, secular weathering, or metasomatism of eruptive basic rocks, has gone on to a remarkable degree throughout the whole region above briefly described. Permutations of this kind tend to produce from the eruptive, now represented by diorite, a series of rocks resembling in lithological character metamorphic chloritic, garnetiferous, and ferriferous schists. The basic character of the prevailing admixtures of the latter, occurring in association with the ferric replacements of corallines, is their most obvious lithological point of difference from the prevailing type of Huronian specular schists, which, as above remarked, are essentially acid. Thus, they more closely resemble certain Laurentian magnetite-schists whose earthy admixtures are generally basic.

Yet quarztiferous aggregates are not wanting among the great variety of ferriferous admixtures here referred to.

The ferro-garnetiferous aggregates are characterized by a sub-crystalline ground-mass of wine-colored garnet, probably magnesian, with druses of magnetite, and a minor proportion of the same oxide irregularly scattered throughout the mass. Narrow ledges of this rare material in West Mine Hill are remarkably continuous. Their occurence is under such circumstances in general as to indicate their relation to the single series of dikes, the individuality of some of which has been preserved within the compass of their collective overflow. So considered, they may be taken as a special metasomatic transformation, governed by obscure local conditions, of certain dikes belonging to the same series as chloritic, epidotic, and ferriferous outcrops, as well as distinct dioritic courses, readily differentiated as dikes, within the more porphyritic mantle. The latter, it is conceived, represent, under limited dynamical conditions (whence their extreme density of grain amounting in places to almost aphanitic aggregation), the least advanced state of weathering of the original eruptive. Among the numerous pseudomorphic relations of garnets, may be recognized some corresponding in kind to the metasomatic relations that may be supposed to exist between massive garnet rock and basic eruptives, along with the altered alumino-magnesian silicates whose transformation has also been wholly or in part by loss of certain ingredients.

Labradorite-diorite more or less chloritic and of metamorphic origin, as well as metamorphic representatives of a long series of intrusive species of rocks, have been described by Professor Dana and the late Mr. Hawes. "The fact," as remarked by Mr. Hawes, "that metamorphic action can produce rocks exactly like the igneous in external aspect and chemical constituents is of great interest in the study of rocks."* It seems almost certain that ancient eruptives afford few if any standards for such comparison where permutations of the nature of metasomatism have not led to their resemblance to related metamorphics. This may be assumed especially in the case of chloritic and epidotic rocks.

The chloritic products from alteration of the Sierra Maestra epidotic diorite closely resemble, as above remarked, metamorphic occurrences of chloritic schists. Such resemblances tend to indicate, indeed, a middle ground where meet products lithologically identical, proceeding on the one hand from basic eruptive rocks by metasomatism, and on the other hand from sedimentary rocks by metamorphism. Resemblance between essentially chloritic aggregates of both types hardly needs the confirmation of analyses.

The diorite of the Sierra Maestra, though not without traces of orthoclase, is essentially plagioclastic. The syenite is mainly orthoclastic, with occasional crystals of triclinic feldspars. The basalts indicated by Ansted in 1856 would now be classed as diorite.†

LEHIGH UNIVERSITY,
BETHLEHEM, Pa., Oct. 10, 1884.

* *American Journal of Science*, 1876, xi., 126. † Proc. Geol. Soc., xii., 144.

EXPERIMENTS ON THE FORCE OF WATER-RAM.

At the last meeting of the American Society of Civil Engineers, a paper was read by Edmund B. Weston, M. Am. Soc. C.E., giving a description and the results of some experiments that were made to ascertain the force of water-ram that could be generated above the static pressure in water-pipes under various conditions. The experiments were made at Providence, Rhode Island.

A combination of iron pipes of different sizes and various lengths was used in making the experiments. An air-chamber, 2½ inches in diameter, and 42 inches in hight, that could be used or thrown out of service at pleasure, was connected with a 2½-inch pipe of the combination.

The water used was taken from a distribution-pipe, which was supplied by two 24-inch mains. The quantity of water that flowed through the pipes was measured in each instance.

The force of the ram was ascertained at the different points in the pipes by the aid of a Richards steam-engine indicator. The force of the ram was produced by suddenly closing a valve in the outlet-pipe, and it was regulated by screwing orifices of different sizes to the outlet-pipe.

The results of some of the experiments are as follows:

FORCE OF RAM GENERATED IN A LINE OF PIPE CONSISTING OF 111 FEET OF 6-INCH, 58 FEET OF 2-INCH, 99 FEET OF 1½-INCH, AND 4 FEET OF 1-INCH, WHICH WAS THE OUTLET-PIPE.

Orifice of discharge in inches.	Velocity in the 1-inch pipe.	Ram in pounds per square inch.						
		1 inch.	1½-inch. Distance from 2-inch.			6-inch.	Dead end.	
			32 ft.	49 ft.	67 ft.		2½-inch.	The same with air-chamber.
3-16	2·57	72·4	72·4	70·8	70·3	14·5	18 8	
¼	5 36	129·3	125·9	127·0	128·8	23·5	42·2	16·8
⅜	10·05	....	....	....	....	51·7	88·3	46·3
½	19·23	....	...	...	....			

The dead end referred to in the above table was a continuation of the pipe beyond the point in the 6-inch where the 2-inch was connected, and consisted of 70 feet of 6-inch, 66 feet of 4-inch, and 4 feet of 2½-inch, which was at the extremity, and located, measuring on the line of pipe, about 322 feet from the orifice of discharge.

FORCE OF RAM GENERATED IN A LINE OF PIPE CONSISTING OF 111 FEET OF 6-INCH, 58 FEET OF 2-INCH, 48 FEET OF 1½ INCH, 3 FEET OF 3-INCH, 48 FEET OF 1½-INCH, AND 4 FEET OF 1-INCH, WHICH WAS THE OUTLET-PIPE.

Orifice of discharge in inches.	Velocity in the 1½-inch pipe.	Ram in pounds per square inch.			
		1½-inch. 16 ft. from 3-inch.	Center of 3-inch.	1-½ inch. 16 ft. beyond 3-in.	
3-16	1·19	75·3	64·5	61·2	
¼	2·37	126·4	120 8	113·8	
5-16	3·00	150·2	150·5	138·9	
⅜	4·47	203·3	206 8	195·3	

FORCE OF RAM GENERATED IN A LINE OF PIPE CONSISTING OF 182 FEET OF 6-INCH, 66 FEET OF 4-INCH, 4 FEET OF 2½-INCH, 1 FOOT OF 2-INCH, 7 FEET OF 1½-INCH, AND 6 FEET OF 1-INCH, WHICH WAS THE OUTLET-PIPE.

Orifice of discharge in inches.	Velocity in the 1-inch pipe.	Ram in pounds per square inch.					
		1-inch.	1½-inch.	2½-inch.	6-inch.	With air-chamber.	
						2½-inch.	6-inch.
¼	5·39	66·7	49·4	22·2	4·8		
5-16	6·71	76·1	61·5	35·6	6·6		
⅜	10·02	106·3	81·8	52 0	15·8	14·0	12·3
½	20·94	177·5	121·5	99·0	36·8	38·7	25·6
1	43·90	....	....	183·0	80·1	105·8	65·6

BESSEMERIZING COPPER MATTE.—At the Cobar Works, New South Wales, the Bessemerizing of copper matte has been started by C. F. J. Wautin.

COLLIERY EXPLOSION IN HUNGARY.—An explosion has occurred in the colliery of the Staatsbahn Company at Anura Steyrdorf, in the south of Hungary. Seventy-five men were killed. The explosion was caused by coal-dust. The Staatsbahn Company will provide pensions for the families of the victims, as it has a relief fund of 2,000,000 florins.

THE MANSFELD COPPER-WORKS IN 1883.—In 1883, the famous Mansfield corporation mined 536,085 tons of ore, and roasted 36,637 metric tons of crude matte, producing as a by-product 17,474 tons of sulphuric acid of 50 degrees Baumé. This roasted matte, together with 549 tons of siliceous ore, produced 17,224 tons of a second matte, from which 68,463 kilograms of silver were extracted. Out of the 17,438 tons of residue from leaching, 12,836 tons of refined copper were made at the Kupferhammer works. There were 72 kilns for roasting crude matte, with three systems of sulphuric acid chambers, having an aggregate cubical contents of 19,969 cubic meters; and at the Eckhardt works, 32 kilns and two systems of chambers, with an aggregate capacity of 9433 cubic meters. At the former works, were kiln roasted 108 tons of matte daily, and at the latter 125 tons, the production of sulphuric acid for 100 tons of matte having been 51·10 and 47·23 per cent, respectively. The total receipts of the company were 26,262,015 marks, of which 15,356,459 marks were obtained for copper, 10,213,224 marks for silver, 547,333 marks for sulphuric acid, 80,773 marks for products containing nickel, and 63,995 marks for a variety of other products. Exclusive of officers, 44,636 men were employed.

FURNACE, MILL, AND FACTORY.

The property of the Falcon Iron Company, at Watertown, Pa., was sold December 13th, by the sheriff. The Thomas Iron Company purchased the two furnaces, several houses, and several tracts of ore land, for one dollar, subject to a heavy mortgage. Samuel Thomas also secured the company's railroad and several tracts of land in Upper Saucon, Lehigh County, for one dollar, subject to a mortgage.

A shipment of 200 tons of pig-iron from Pensacola, Florida, will soon arrive in Philadelphia, Pa. This will be the first shipment of pig-iron from a point so far South.

The Adams, Posey & Bayly Hardware Company, doing business at Silverton and Durango, Colo., has been organized with a capital stock of $50,000.

The Edgar Thomson Steel-Works, at Braddock, Pa., shut down December 16th, owing to the depression in business and lack of orders. About 1600 employés are directly affected by the suspension. The monthly pay-roll of the firm amounted to $150,000.

The American Wood and Powder Company magazine, at Secaucus, New Jersey, six miles from Jersey City, was demolished by an explosion, December 15th.

The members of the Western White Lead Association held a meeting at Pittsburg, Pa., December 11th.

The Stillwell & Bierce Manufacturing Company, Dayton, Ohio, has just completed a two-story brick addition to its works, 175 by 40 feet, for its wood-working department. It manufactures turbine water-wheels and feed-water heaters.

The Gale Manufacturing Company's works, at Albion, Mich., were burned December 10th. They were insured for $65,000, which will probably cover the loss.

The large sheet mill of Singer & Nimick's steel-works, Pittsburg, Pa., has shut down on account of lack of orders. All the other departments of the works are running single turn.

Chess, Cook & Co.'s nail mill, Pittsburg, Pa., has resumed operations, after six months' idleness.

Schoenberger's old mill, at Pittsburg, Pa., is running double turn, and the new mill started up on December 15th.

There is some probability of the Hall rolling-mill, at Hubbard, Ohio, passing into other hands, who will operate it.

The Merchant iron mills and the Fisk plate and nail plate mills at Bayview, Wis., resumed operations December 15th. The mills had been gradually laying off men and curtailing or entirely suspending work for several months, and since a week ago the entire rolling-mill works have been idle, the Merchant mills shutting down at that time. By the resumption of work, 1400 men will be given employment.

Owing to dullness of business, the Ontario Car Works, London, Ont., closed December 13th.

The Arizona Mineral Belt Railroad has concluded a contract with the Cambria Iron Company, of Johnstown, Pa., for 8000 tons of steel rails, to be delivered in April, May, June, and July, 1885.

The Dudswell Gold Mining Company, in the province of Quebec, has contracted with Henry B. Murray, agent of the Excelsior Iron-Works, of Chicago, for a complete ten-stamp California gold quartz mill, to work its rich ground. The Dudswell Company, after looking over the machinery field, concluded that the California mill was the very best for its purpose, the ore being rich and in large quantity.

Messrs. C. G. Hussey & Co., of Pittsburg, whose copper rolling-mills were established in 1849, have issued a very neat descriptive list of the copper and brass goods manufactured by them. They have added some interesting tables, giving the weight of sheet copper per square foot, bolt copper per lineal foot, and of copper and brass wire and plates.

H. K. Porter & Co., of Pittsburg, have just shipped a small mining locomotive to Pocahontas, Virginia, and another to the Knoxville Iron Company's mines, near Jellico, Tennessee. They are also sending a logging and plantation locomotive to the New Orleans Exhibition. H. K. Porter & Co. have decided to keep on hand constantly in stock their narrow-gauge locomotives specially adapted for contractors' use and logging and plantation roads.

The haulage plant (tail-rope system) furnished by the Webster, Camp & Lane Machine Company, of Akron, Ohio, for the Isabella Furnace Company's mine, near Cokeville, Pa., has been completed and put in operation, and is reported to be fully meeting expectations.

A movement is on foot among the nail manufacturers to get all the factories to close down until the trade improves. The question was discussed at the last meeting of the Western Nail Association, but no conclusion was reached.

Notice has been given the boilers, muck-rollers, and helpers of the Jefferson Iron-Works at Steubenville, Ohio, that their departments will close down December 20th. The remainder of the works will shut down in three or four weeks. The competition in the manufacture of steel rails and the large stock on hand are the reasons given.

The Iron Mountain Company is pushing the erection of its works at Durango, Mexico. The foundry and machine-shop are completed, and the blast-furnace is expected to be in operation early in 1886. There are now *en route* two car-loads of machinery, and other portions of the equipment are contracted for and will soon be shipped. The furnace will be blown by a Weimer engine, and the tunnel fitted with as Weimer top and gas seal. For the present, the boilers will be used for both furnace and machine-shop. As soon as the blast-furnace is completed, the company contemplates the erection of a rolling-mill, etc.

RAILROAD NEWS.

The Tennessee Coal, Iron, and Railroad Company's report for November shows coal received directly from the mines 12,887 tons, and coke 8234 tons; total for the year, 230,151 tons.

The anthracite mines of the Erie Railroad, which have heretofore been worked by those who paid a royalty on each ton of coal mined, will now be worked by the company, and it is said that the company will enter the market as a seller of coal. The thirty-six miles of road by which the Erie reaches its own mines are used by the Delaware & Hudson Company to bring its own coal out in the winter season.

A mortgage for $1,500,000 has been filed in Pennsylvania to secure the first mortgage bond of the Ohio River & Lake Erie Railroad. The object of the road, now in course of construction, is to furnish a new outlet to the lake for the coal-fields of Mercer and Butler counties.

The elevated railroads of New York City will next week award the contracts for 130,000 tons of coal for 1885.

The annual report of the East Tennessee, Virginia & Georgia Railroad Company states that the shipments of coal from the Ohio Branch continue to show an increase. The new mines that were opened near Newcomb and Jellico are in successful operation, and are producing coal of an excellent quality. There were shipped from the Ohio Branch during last year, 335,376 tons, including 126,201 tons of company's coal. The increase in the total shipments amounts to 57,866 tons, equal to 20·7 per cent. The shipment of revenue coal shows an increase of 19,714 tons and the revenue an increase of $20,624. The coal mines on the Alabama Division have also increased their output. Brierfield mines furnished this company with 10,533 tons, and Montevallo mine furnished it 3560 during last year. Owing to overproduction and consequent depression of the iron industries, the expectation that large coke iron furnaces would be erected on the Alabama Division as soon as a supply of coke could be secured has not yet

been realized. A 100-ton coke iron furnace has been erected on the main line of the road, near Chattanooga, by the Citico Iron Company, and is now in successful operation, giving the company considerable business.

The Colorado Midland Railroad proposes building its road from Colorado Springs to Aspen. It passes through a large mineral country, and reaches the coal-fields of Gunnison County, and will so insure the smelters of Leadville and Aspen a coke supply that can be delivered cheaper to them than at present.

The property and franchise of the Rio Grande & Pecos Railroad, extending twenty-seven miles from Laredo to Santa Tomas, Texas, were sold at auction December 18th for $100,000 to Charles B. Wright. The sale was by order of the trustees of the mortgage and in the interest of the bondholders.

LABOR AND WAGES.

Carnegie Brothers & Co., operating the Union Iron Mills at Pittsburg, Pa., have made a reduction of from 10 to 15 per cent in the wages of all employés excepting those governed by the Amalgamated Association scale, December 15th. About nine hundred men will be affected.

The Isabella Blast-Furnace Company, Pittsburg, Pa., has ordered a reduction of 10 per cent in the wages of all its employés. To offset this, however, the rents of the company's houses have been reduced 10 per cent.

The rolling-mill and blast-furnace at Brazil, Indiana, which have been idle for some time, have resumed operations with a reduction of from 8 to 15 per cent in wages.

A reduction of 10 cents a ton from the rate for mining screened coal went into effect December 15th, at Bustard's coal shaft, Steubenville, Ohio. The miners are digging for 70 cents a ton, and lately returned to work after a long strike.

The employés of the Keystone Bridge Company, Pittsburg, Pa., who have been notified that a cut of from five to fifteen per cent in their wages would take effect on January 1st, have decided to strike against any reduction.

The New Jersey Steel and Iron-Works, Trenton, N. J., have given notice to their employés of a 10 per cent reduction in wages after the 17th inst.

The Goss Marine Iron-Works, at Bath, Me., announces a reduction in wages of from 10 to 15 per cent, to take effect December 22d.

The Scott Foundry, of the Reading Iron-Works, Reading, Pa., has discharged half of the hands and reduced the wages of the remainder 10 per cent.

A meeting of miners was held recently at Leadville, Colo., for the purpose of taking steps toward organizing a miners' union.

The Republic Iron-Works, Pittsburg, Pa., resumed operations December 15th at 10 per cent reduction in the wages of all employés excepting Amalgamated scale men.

The Hocking Valley, Ohio, miners continue to receive aid from various quarters. The difficulties have not yet been fully settled. The mines are now running with nearly their full force, the places of the strikers having been filled. Thousands of idle men are in the valley.

A general suspension in all the coal mines along the Monongahela and Youghiogheny rivers will probably take place December 22d. The operators declare they will not pay the extra half-cent per bushel for mining demanded by the Miners' Convention at Monongahela City, December 15th. They assert that the men will average $3 a day at the present rate, and that the best way out of the difficulty will be to shut down indefinitely if the miners insist upon having the advance. About four thousand men are employed in these mines.

The employés of the Burden Iron-Works, Troy, New York, have accepted a reduction of from 10 to 12 per cent in their wages, to take effect December 29th.

All the laborers at the Soddy coal mines, Tennessee, have quit work in consequence of a 10 per cent reduction in their wages. Three hundred men are idle.

The machinery molders of Pittsburg, Pa., have issued a circular calling a meeting of the craft, December 23d, to consider the proposed cut in wages, and requesting all to stand out against any reduction.

Four hundred miners struck, December 16th, at Coshocton, Ohio, against a reduction of 12½ cents a ton. The operators have been paying 97½ cents, and claimed that the work was no longer profitable at that figure, which also is more than is paid at any place outside of the county.

The mines of Soddy, Tenn., have been vacated. About 500 men are thrown out of employment.

In Waterbury, Conn., the Scovil Manufacturing Company, brass goods, which reduced its workpeople to three-quarter time about two weeks ago, began running full-time again December 18th.

COAL TRADE NOTES.

CANADA.

PROVINCE OF MANITOBA.

The discovery of coal at Crowfoot Crossing, 800 miles west of Winnipeg, on the Canadian Pacific Railroad, is reported. Experienced men were employed by the company, and a seam fourteen feet thick has been discovered 185 feet below the surface. It is pronounced to be an excellent specimen of the anthracite variety.

NEBRASKA.

Farmers in Nebraska and other parts of the Northwest are burning corn for fuel. They have figured the matter out to their own satisfaction, and have come to the conclusion that it is cheaper to burn corn than it is to sell it and buy coal. Soft coal is worth in this State about 22 cents a bushel, and corn does not find a ready sale in the rural markets for more than 12 cents. Experiments have shown that two bushels of corn will produce more warmth than one bushel of coal, and farmers are thus burning the former.

OHIO.

Reports from Steubenville state that Avenik's shaft, after two or three weeks o idle time, has started up again, but the prospect for steady work is any thing but promising. The two shafts operated by the Jefferson Iron Company are doing but very little. The low-down shaft, better known as the Borland shaft, supplies the city with coal. The old shaft supplies the mill with coal, and as the boilers are doing but little work, only averaging two days a week, in consequence of the company manufacturing steel nails and purchasing its material abroad, it brings down to a great extent the product of coal. The gravel shaft that has been idle since last spring has started up again. The coal hoisted out of this mine is retailing in and around the city.

NATURAL GAS.

The Jefferson iron-works' gas-well No. 2, at Steubenville, was torpedoed December 15th. The well failed to respond, and was abandoned.

PENNSYLVANIA.

ANTHRACITE.

Owing to the stoppage of a fan at No. 10 mine, in Sugar Notch, December 11th, gas accumulated in one of the chambers of the mine. An explosion took place, by which one man was instantly killed and three other miners were seriously burned.

The Lehigh Valley Coal Company has struck a vein of coal at Montana colliery, near Ashland, from which it expects to ship 150 cars daily and employ 350 men. Rappahannock colliery, near Girardville, owned by the same company, is almost completed, and will ship 250 cars daily and employ 500 men. Lilly, Lentz & Co.'s colliery at Park Place, near Mahanoy City, is nearing completion, and will make daily shipments of 200 cars.

Active operations have been resumed on the work of sinking the air-shaft of the Black Diamond colliery at Luzerne borough, which is now operated individually by Mr. J. C. Haddock, of New York.

The Lackawanna Iron and Coal Company's reservoir at Scranton, burst December 16th, and millions of gallons of water swept over Scranton flats. The reservoir held twenty-two feet of water, and had a capacity of 19,000,000 gallons.

At No. 11 mine of the Lehigh & Wilkes-Barre Company, known as the Lance colliery, at Plymouth, December 17th, three acres of land sank nearly five feet. The accident is supposed to have been caused by a lack of propping after the robbing of the pillars of coal left to protect the surface from falling.

COKE.

The Connellsville *Courier* reports that the daily output is down again to 500 cars, and promises to drop still lower. In the mean time, coke is accumulating again at the works. Loaded cars are standing on the sidings for which the syndicate are unable to give destination. In order to offset this depressing feature of trade, the operators are resorting to short hours again. This week, most of them run but four days, and the prospects are, that they will not run full-time for some weeks. The lack of water continues a drawback at some of the works, and considerable apprehension is felt that the difficulty may continue through the winter. The railroad carrying pool expired November 1st, and efforts are making to form a new one, and the percentages are likely to be somewhat modified.

The relief association of the railroads has been of such manifest advantage to the employés that the H. C. Frick Coke Company contemplates the adoption of a similar plan for the benefit of its employés.

The Connellsville coke syndicate decided, December 18th, to shut down 10 per cent more of the ovens. This restriction will leave only 40 per cent of the ovens controlled by the pool in operation. The members of the combination assert that, for the purpose of breaking up the pool and reducing prices, the pig-iron men are supporting outside producers.

NATURAL GAS.

The Springdale Natural Gas Company has its well at that place down over 1000 feet, and expects to strike oil at about 1200. In drilling, it has passed through three small pockets of gas.

The stock of the Westinghouse (Philadelphia) Natural Gas Company has all been taken up.

Jones & Laughlin, iron manufacturers, who have been drilling for gas at their works in Ormsby, have struck a large vein of gas.

The figures from the tests made at the Edgar Thomson Steel-Works recently are not yet ready. The company pays the same price for gas as for coal, and has to lose the payment on the amount of work done. The company is very well satisfied with the gas and its results. It saves it the money it had to spend in handling coal and ashes.

GENERAL MINING NEWS.

ARIZONA.

MARICOPA COUNTY.

UNITED VERDE.—The new 30-ton smelter is about finished and will start up soon. The company has taken the precaution this winter to guard against any more delays from a scarcity of coke, by having enough on hand at present and *en route* to last until spring, which will guarantee an uninterrupted run of the furnaces.

MOHAVE COUNTY—HACKBERRY DISTRICT.

BURRO.—A mill is to be erected.

HAULAPPAI.—The property is looking well. Some of the ore is to be sent to Pueblo, Colo., for treatment.

INDIAN QUEEN.—The lowest level in this mine is 560 feet. A large body of ore has been found. The mill is running regularly. The coal used by the company is brought from Gallup, New Mexico.

CALIFORNIA.

AMADOR COUNTY.

PLYMOUTH CONSOLIDATED.—The mine is looking well. A recent estimate shows enough high-grade ore in sight to keep the mills running nearly two years, and sufficient low grade for four years more. The company is about to sink the shaft to open another level. Meanwhile, prospect-work is carried on in the ground south of the main shaft, where a tunnel 500 feet long has been run on the lode line, 1200 feet below the surface. Indications point to the existence of a valuable body of ore there. A new shaft is also sinking east of the main mine on a parallel vein. The whole mill-power of 120 stamps is running regularly and every thing by water-power.

MONO COUNTY—BODIE DISTRICT.

Reports for the week ended December 8th:

BODIE CONSOLIDATED.—During the past week, 152 tons of ore were worked at the mill. The average assay value of the pulp was $32.17 a ton. The south drift 20 feet above the 550 (Lent shaft) level is now on the Mono south line. It is in very rich ore, and has been in good ore for 30 feet. Native silver and gold are to be seen with the naked eye. An assay from it, taken from three feet of it across the face, went $617, from 60 to 70 per cent silver. Reports, dated December 10th, state that hauling ore from the mine to the mill was suspended to-day, and the mill will shut down in a day or two, immediately after a clean-up. Several reasons are assigned for this, among which is the great expense and difficulty during the present cold weather in keeping up the water supply; but the principal cause is probably the desire to prospect the mine more thoroughly and put the ore-bodies in shape for a continued run and a fair average in the output. A large force will be kept at work prospecting the mine, and the number of men employed will not be diminished.

MONO.—The ore of the recent strike increases in richness to the southward as depth is attained.

STANDARD CONSOLIDATED.—There were extracted and shipped to the mill 534 tons of ore and 600 tons of tailings. Received from the ore 520 ounces of crude bullion, and from the tailings 200 ounces. An uprise has been started near the south line, to cut the Fortuna vein, which, from recent explorations in the Bodie mine, seems to run into Standard ground. The working of tailings has stopped on account of snow. There is no improvement to report in the character of the ore coming from the stopes. It is running very low.

PLACER COUNTY.

CALIFORNIA LIME COMPANY.—This company has been formed to develop some extensive limestone beds in the vicinity of Clipper Gap, which are believed to be a continuation of those at Cave Valley, on the El Dorado side of the American River. Men are at work grading a road from Clipper Gap to the ledges, and during the winter, kilns will be constructed and every thing got in readiness for active operations in the spring.

PLUMAS COUNTY—GREENVILLE DISTRICT.

BONANZA.—The mine has been drained and work will soon be resumed.

OPHIR CONSOLIDATED.—A shaft has been sunk in the tunnel, on the ledge, which widens one foot in five downward. Five hundred feet up the mountain, and on the line of the vein, the ledge has been struck a few feet from the surface.

CANADA.

PROVINCE OF ONTARIO.

SILVER MOUNTAIN.—Capt. Richard Trethewey has given to the Sarnia *Observer* the following particulars on the Silver Mountain silver find: The specimens that attracted our attention were taken by him a little more than two weeks ago from Silver Mountain, near Whitefish Lake, distant from Port Arthur about forty miles, and from Murillo station, on the Canadian Pacific Railroad, about twenty miles. More particularly, the mine is located on survey R 53 and 54, near Whitefish Lake, Thunder Bay District. Its original discoverer was Mr. Oliver Daunais, a successful explorer, and who, by the way, was the discoverer of the famous Rabbit Mountain mine. Through his intimacy with the Indians of that vicinity, he was fortunate enough to be able to trace out this mine, the existence of which was known to the Indians for centuries, and was handed down by them as a tradition from generation to generation. Mr. Daunais invited Captains Richard and John Trethewey to examine his find and share with him the work of developing its resources, if, in their opinion, it was considered sufficiently valuable to warrant operating it. The brothers Trethewey, who, from their long connection with the famous Silver Islet mine, were known as the most experienced miners in that region, visited the place in October last, and the sight that was revealed to them more than exceeded their wildest anticipations. Beginning at the surface, a small excavation some eight feet in depth was made, and from this the samples brought to Sarnia were taken. The vein or lode at the point where opened, was three feet in width, increasing in size as depth was attained. But farther up the mountain, where the vein again crops out, it shows a width of ten feet. Following the vein along the surface, several other pits were opened, and at all points it was found incased between two smooth and well-defined walls. In each and all of these pits, rich specimens of sulphide and native silver were found. One pit, 9 feet long and 8 feet deep, showed rich silver along the whole length of the bottom and extending beyond it at each end indefinitely. From this pit have been taken from eight to ten thousand dollars' worth of silver ore. The general strike or course of the vein is southeast and northwest with a slight dip to northeast. It has been traced a distance of three fourths of a mile in the ranges located and patented by the owners, and silver has been found at different points for that distance. One great feature of the mine, outside of its extraordinary richness, is the economy with which it can be worked. Drifts can be run in from the foot of the mountain and the ore taken out directly, instead of hoisting it from shafts, which involves the use of expensive machinery. Drifts run in this way also furnish an easy mode of drainage, a matter of great importance. Within a quarter of a mile or so, and on property also patented by Captain Trethewey and his co-owners, are two small lakes—Lizard and Daunais, situated about 100 feet above the level of the mine, from which an inexhaustible supply of water may be drawn.

Captain Tretheway was kind enough to show us a report of ten assays from samples of vein rock selected by him, rich and poor, from the pits opened at the mine, which gave the following results:

No. 1, two pieces of stamp rock, from pit No. 1, poorest pieces found assayed, respectively, 235 ounces and 225 ounces per ton. No. 2, a fair sample of vein rock, two assays, averaging 1500 ounces per ton. No. 3, piece of rock, 70 feet from pit No. 1, 3275 ounces per ton. No. 4, rock resembling huntilite ore, 12,500 ounces per ton, and a piece of lean-looking rock, 1440 ounces per ton. No. 5, zinc-blende, showing no silver to the naked eye, 550 ounces per ton. No. 6 (vein rock), zinc-blende and silver, 1995 ounces per ton. No. 7, zinc-blende containing silver, 2162 ounces per ton. No. 8, spar containing native silver, 3250 ounces per ton. No. 9, native and ore, 9380 ounces per ton. No. 10, sulphide, 24,600 ounces per ton.

They are now making a temporary road from the Rabbit Mountain mine, seventeen miles distant, in order to get in supplies, etc., for the use of miners who will be employed there. What is really wanted is a good colonization road from Murillo station through the Whitefish River Valley to Whitefish Lake, a distance of twenty-five miles from the railroad. Such a road would not only furnish an easy and rapid means of communication with the mines in that district, but it would, we are informed, open up a country that will be of great value for farming purposes, as the soil of Whitefish Valley is reported to be very fertile. Captain Trethewey, who traversed it, says it is undoubtedly well adapted for farming. There is also a fair quantity of pine timber through this region, and the opening of a road along the route indicated would be followed by an influx of settlers who would rapidly take up land there for the purpose of cultivation. The discoveries made at Rabbit Mountain, and those at Silver Mountain, above described, by no means exhaust the mineral resources of the region around Whitefish Lake.

PROVINCE OF QUEBEC.

According to the Canadian *Mining Review*, some of the owners of the pyrites mines at Capelton, in the Eastern Townships, have under consideration a proposal to erect a sulphuric acid works in the region of the county of Ottawa, possibly at Buckingham Village, to which a branch of the Canadian Pacific Railroad is now building. In 1865, Professor Bell pointed out the advantages that might result from the establishment of such works, if the apatite could be found in any part of the country in sufficient quantities to guarantee a permanent supply of the mineral.

The total output of the phosphate mines this year amounted to 22,143 tons. Of this amount, 1790 tons came from the mines in the Perth and Kingston districts, leaving 20,353 tons as the product of Ottawa County, as against 15,166 tons in 1883. The price of phosphate has not been large, and impassable roads reduced shipments from the Buckingham District of Ottawa County about 2500 tons. European shipments show an increase this year of 3403 tons.

COLORADO.

BOULDER COUNTY.

SMUGGLER.—It is reported that the mine is again in the same rich ore that a few years ago made her rank as the richest producer in the State for the quantity of ore mined.

CHAFFEE COUNTY.

LIVINGSTON.—The company has closed operations. It is said that a lawsuit is brewing, by the company against Bostwick and McClure, from which interesting developments may be expected.

SEDALIA.—A half interest in this mine has been sold for $5000.

CLEAR CREEK COUNTY.

HUKILL.—A duplex National air-compressor is being [illegible]d in this mine, with which five drills will be operated.

PLEBEIAN.—The mine is now leased and is worked through the Columbia tunnel.

SEVEN-THIRTY.—The new pump that has just been placed in the bottom of the Seven-Thirty shaft, 275 feet below the tunnel, has started up. Its capacity is 100 gallons a minute. The water in the sump, which is 25 feet long, 10 feet deep, and 6 feet wide, was forced to the tunnel level in one hour and forty-five minutes.

DOLORES COUNTY.

GRAND DUKE.—The company has leased the Dawn of Day and Orphan Girl odes, two patented claims on Dolores Mountain.

GUNNISON COUNTY.

GUNNISON SMELTER.—The smelter, owned by Mr. Swan, of Denver, and Mr. Lawrence, of Gunnison, fired up December 8th for a winter's run. The machinery is running very smoothly, and large quantities of ore are received.

VOLUNTEER.—It is the intention to put the Waterman 20-stamp mill in operation, in order to be able to treat the output of this mine, which is now in a condition to give a daily output of 40 tons.

HINSDALE COUNTY.

OCEAN WAVE.—After five years of inactivity, this mine is again to be worked, the legal questions having been settled.

LAKE COUNTY.

The Leadville *Herald* reports the following: Low-grade ores, especially iron ores carrying less than 20 ounces of silver, are practically shut off at present, unless under contract. Our smelters are all well supplied with such ores, and in view of the uncertainty of operations, occasioned by the scarcity of coke, they do not desire to burden themselves with material that they possibly will not have occasion to use for some time.

HENRIETT.—Operations have been suspended. For some time, difficulty has been experienced in handling the water in the lower workings, and the manager is of the opinion that he can readily drain the mine with his present facilities as soon as the Wolf Tone begins operations. The plant on the latter property will be one of the most complete in the camp. The pumps, when once in operation, will materially assist all the mines in the vicinity. It will probably be the middle of January before every thing is in shape for starting. The upper workings of the Henriett will be leased. The royalty will be fair to both miners and the company, and former employés of the mine will have the preference.

LILLIAN.—The mill on this company's property, Printer Boy Hill, is nearing completion. All non-smelting ores will be handled on the ground. This will enable the company to handle all grades of ore economically.

MORNING STAR.—Arrangements are making for concentrating during the winter months.

PARK COUNTY.

BONANZA KING.—Mill run tests on ore from this mine prove its value to be over $100 a ton. The leasers are now going to work to take it out in larger quantities than heretofore.

SAN JUAN COUNTY.

All the principal mines, and in fact nearly all the producing mines in the vicinity of Silverton, will be regular shippers, and vigorous work will be pushed all winter.

SAMPSON.—According to the *Herald*, the mine is mismanaged, and affairs are not in a very flourishing condition. Liens are being placed on the property and suits for the recovery of money are instituted. Already the sheriff has paid his visit to the property, and if prompt measures are not taken, there will soon be nothing left of one of the richest mines in this county.

SUMMIT COUNTY.

CHAMPION.—The lessees are erecting machinery at this mine, and purpose to develop the property.

SILVER GLANCE.—The company has begun work on the Diantha No. 1, near Argentine.

DAKOTA.

LAWRENCE COUNTY.

FATHER DE SMET.—Reports, dated December 1st, show that at the mine some of the principal stopes around the open cuts are not showing quite as well as usual, which possibly may lower the results somewhat in the near future, but we do not expect any great change. In the east cross-cut, second level, an opening has been made north and south on the ledge for about 25 feet, without showing any improvement, and unless a change occurs soon, we shall stop the work for the present. A west cross-cut has been commenced on the 3d level, near the Italian Winze, to cut into the ground lying underneath the Justice cut, and is out two feet, face in low-grade matter. Water gives no trouble now, and the mill is running on full-time. The report of the mine for the week ended December 8th shows ore extracted from the first, second, and third levels, 2000 tons; ore milled, 2000 tons. West cross-cut, third level, advanced 9 feet. Total length, 11 feet.

IDAHO.

The freight rates on ores transported from Haley to Denver, Colo., have been reduced $3.25 a ton.

PHILADELPHIA SMELTING COMPANY.—Only one stack out of the four has been in operation this year, and that did not run steadily. Operations did not begin until the middle of June. The total output so far has been about 1300 tons of bullion, worth an average of $300 a ton, or an aggregate of about $400,000.

MAINE.

EDGECOMB.—This mica company is now taking out spar at the rate of 100 tons a week. The drill is kept running on nearly double time.

MEXICO.

CUSIHUIRIACHIC.—This company hopes to get the fifty-stamp mill done in February, and soon afterward to be producing. The mines are in prime condition and many tons of ore await the completion of the mill. Work has been begun on a railroad from Chihuahua to the Santa Madre Mountains, which will pass close by Cusihuiriachic, benefiting the property greatly.

MICHIGAN.

GOLD MINES.

PHILLIPS.—The final arrangements have been concluded for the purchase of the Phillips mine property, comprising the southeast quarter of the northeast quarter of section 30, and adjoining the Ropes mine property, immediately on the west.

IRON MINES.

DETROIT.—An important find of ore, and one that materially enhances the value of this mine, has been made. An analysis shows it to be Bessemer, carrying over 60 per cent of metallic iron. The main shaft of this mine is 315 feet deep.

EMMETT.—The company's great shaft on the tract adjoining the Ludington, owned by that company, is down 530 feet, and is getting close to the ore. The Marquette *Mining Journal* says that the sinking of this shaft is one of the greatest mining achievements yet undertaken in this district.

IRON STAR.—At this mine (formerly the Great Western), pumps are being taken out preparatory to an absolute suspension of work. This mine has had a checkered career, but is regarded as a good property, despite the ill-fortune that seems to have attended it.

NORWAY.—Large pumping machinery is erecting at this mine.

MONTANA.

LEWIS & CLARKE COUNTY.

Capitalists have bonded twenty-two properties in Ten Mile District and begun active operations. If a purchase is made, a branch railroad from Helena, similar to the Wickes branch, will be constructed in the spring, and reduction-works will be erected. The new 50-ton concentrator, erecting in Ten Mile District, by J. G. Murphy and his partners, is about completed and will be ready to begin operations soon.

MISSOULA COUNTY.

MABEL.—When the shaft has attained a depth of 100 feet, drifts will be run and the extraction of ore begun.

SILVER BOW COUNTY.

ALICE.—The company is figuring to put in a large Brush electric light plant to light the mill and hoisting-works, and also the stores in Walkerville. It is thought

that the revenue from outside lights will pay all the expense of operating the entire plant. A contract has just been let for sinking the Magna Charta shaft to the 700-foot level. Work has begun.

PARNELL AND JOHN MITCHEL.—These mines have been bonded to William H. Davis, of San Francisco, for $20,000.

NEVADA.

ESMERALDA COUNTY.

HOLMES.—This company has secured possession of the Northern Belle, and the transfer deeds have been recorded. The mill of the Holmes Company will start up January 1st.

MOUNT DIABLO.—The mill will start up January 1st. The force at the mines is to be increased.

EUREKA COUNTY.

ALBION VS. RICHMOND.—The argument on motion for a new trial in this case was continued before the court at Eureka, December 9th.

EUREKA CONSOLIDATED.—The close-down at the reduction-works is only temporary and for repairs. Improvements are making by which more ore can be reduced at cheaper rates.

HUMBOLDT COUNTY.

PARADISE VALLEY.—The mill will be rebuilt immediately, as there is an abundance of ore on the dumps and plenty more in sight in the mine. No assessment will be levied to build the new mill.

STOREY COUNTY—COMSTOCK LODE.

The pumping machinery at the Combination shaft will be in operation January 1st. As soon as the new pumping machinery is put in place, the Chollar and Hale & Norcross will begin opening the 3000-foot level. It is expected that the new pump will be in operation by Christmas. After that, exploratory work will probably be continued on a large scale.

The fire that occurred in the old Central tunnel of the Ophir December 6th, on the 250 level, caused no serious damage, but will stop the extraction of ore from that level for the present.

The Alta and Benton mines have been shut down. The draining of the whole line of flooded mines in the south end, with their pumping facilities, was found to be impracticable. At last reports, the water was some distance above the 1850 level.

NEW MEXICO.

SAN PEDRO & CANON DEL AGUA.—Proceedings were recently instituted in New Mexico by certain bondholders to break up the foreclosure and sale of the San Pedro & Cañon del Agua Mining Company to Messrs. Morse and Ballou. A dispatch just received from Santa Fé announces that the application for an injunction and receiver has been denied, and that the foreclosure and sale are valid.

PENNSYLVANIA.

Reports are, that the hills of Crawford County contain mines of silver, lead, and other minerals.

UTAH.

BEAVER COUNTY.

The sulphur beds near Cove Creek are developing. The refined sulphur is sold at the works for $40 a ton. The mines are thirty miles from the railroad.

HORN-SILVER.—The work of development on the North Horn-Silver, the property of this company, is vigorously pushed. This mine is the extension of the Horn-Silver on the north. It is rumored that the working force at the Horn-Silver mine and smelter is to be reduced.

MORGAN COUNTY.

NORWAY IRON COMPANY.—Work has begun for the winter, to extend the General Grant Tunnel.

SUMMIT COUNTY.

BON HOMME.—Operations have been suspended for lack of funds.

WASHINGTON COUNTY—SILVER REEF.

CHRISTY.—This mine, which has been idle for some time, has just shipped bullion valued at $10,211.

PATENTS GRANTED BY THE UNITED STATES PATENT-OFFICE.

GRANTED NOVEMBER 4TH, 1884.

307,424. Air-Injector for Furnaces. George W. F. Bennett, Cranbury, New Jersey.
307,433. Composition for Steam-Packing. John H. Cheever, New York City.
307,442. Air-Compressor. Michael Cullen, Hartford, Conn.
307,443. Pumping-Engine. Joseph D. Davies, Natchez, Miss.
307,465. Spark-Arrester. George D. Hunter, Terre Haute, Assignor of two thirds to Thomas C. Van Nüys and Morton C. Hunter, both of Bloomington, Ind.
307,466. Air-Feeding Device for Furnaces. Thomas W. Jenkins, Philadelphia, Pa.
307,473. Rolling-Mill Hooking-Machine. David H. Lentz, Indianapolis, Ind., Assignor of one third to John Thomas, same place.
307,507. Ratchet Drill. Charles E Tunelius, Chicago, Ill.
307,513. Ore-Crusher. Jacob C. Wiswell, Medford, Mass.
307,514. Mining-Machine. Bernard Yoch, St. Louis, Mo.
307,521. Machine for Cross-Seaming Sheet-Metal. Orrin W. Burritt, Weedsport, New York.
307,550. Boring-Machine. Giles A. Jackson, Oakland, Cal.
307,552. Device for Feeding Shavings, etc., to Furnaces. Thomas W. Jenkins, Philadelphia, Pa.
307,560. Ore-Concentrator. George H. Mather, San Francisco, Cal.
307,573. Coal-Washing Machine. Samuel Nevins, Summit Hill, Pa.
307,582. Compound Ingot. John Pedder, Pittsburg, Pa.
307,583. Mold for Casting Ingots. John Pedder, Pittsburg, Pa.
307,590. Sheet-Metal Roofing-Plate. Patrick H. Regan, Nashville, Tenn.
307,606. Well-Drilling Apparatus for Oil, Gas, or Water. George Westinghouse, Jr., Pittsburg, Pa.
307,612. Inertia-Recording Mechanism for Steam-Engines. Edwin F. Williams, Philadelphia, Pa., Assignor to the Crosby Steam-Gauge and Valve Company, Boston, Mass.
307,640. Tripod for Rock-Drills. George M. Githens, Brooklyn, New York.
307,641. Clamp for Steam Rock-Drills. George M. Githens, Brooklyn, New York.
307,642. Rock-Drill. George M. Githens, Brooklyn, New York.
307,667. Treatment of Iron Oxides. James Mason, Eynsham Hall, near Witney, County of Oxford, England.
307,669. Wire-Stretcher. Hugh McIntosh, Decorah, Iowa.
307,671. Nut-Lock. William J. McTighe, Pittsburg, Pa.
307,673. Barbed Fence. John W. Nadelhoffer, Joliet, Ill.
307,680. Boring-Machine. Hubert M. Perry, Muskegon, Mich., Assignor of one half to Alexander Rogers, same place.
307,710. Drilling-Machine. Ferdinand J. Dubrul, Columbus, Ohio.
307,720. Door for Coke-Ovens. John Herron, Dunbar, Pa., Assignor of one half to Joel Stoneroad, Jr., same place.
307,733. Hand Rock-Drill. Hadwen Swain, Denver, Assignor to John A. Farron, John R. Van Evera, and Robert M. McDermott, Leadville, Colo.

GRANTED NOVEMBER 11TH.

307,749. Drilling-Machine. Eben A. Delano, Chicago, Ill.
307,753. Adjustable Rod and Box for Water, Gas, and Steam Pipes. Henry E. Earle, Danbury, Conn.
307,702. Rock-Drilling Machine. John L. Harkness and Charles B. Shaw, Oskaloosa, Iowa, said Shaw Assignor to said Harkness.
307,792. Machine for Channeling Rock for Grindstones, etc. Michael J. O'Connor, Louisville, Ky.
307,829. Gas-Furnace for Melting Glass, etc. Joseph Anderson, Pittsburg, Pa.
307,838. Fuel Composition. Revere M. Freinig, Brooklyn, New York.
307,845. Siphon-Tap for Furnaces. Joseph S. Curtis, Washington, D. C.
307,861. Pneumatic Mining Tube. Harvey R. Leonard and William Corcoran, San Francisco, Cal.
307,865. Machine for Rabbeting, Grooving, or Molding Stone. Alexander McDonald, Cambridge, Mass., Assignor to the McDonald Stone-Cutting Machine Company, Nashua, New Hampshire.
307,874. Bessemer Converter. Hermann Shulze-Berge, Rochester, Assignor to Henry W. Oliver, Jr., and James P. Witherow, both of Alleghany City, Pa.
307,884. Apparatus for Operating Tools by Electricity. Charles J. Van Depoele, Chicago, Ill.
307,924. Furnace for the Calcination of Ores. James Douglas, Jr., Phœnixville, Pa.
307,928. Charcoal Oven. John A. Edwards, Columbiana, Ala.
357,940. Barbed Fence-Strip. Elbert E. Hawkins, Wilkes-Barre, Pa.
307,970. Smoke-Consuming Furnace. George W. Mears, Norwalk, Ohio.
307,982. Centrifugal Amalgamating Machine. Galen W. Pearsons, Kansas City, Mo., Assignor of one half to B. F. Jones, same place.
307,988. Dynamite. Joshua H. Robertson, San Francisco, Cal., Assignor to Charles W. Randall, same place.
307,989. Explosive Compound. Joshua H. Robertson, San Francisco, Cal., Assignor to Charles W. Randall, same place.
307,994. Manufacture of Bichromate of Soda. William Simon, Baltimore, Md., Assignor to the Baltimore Chrome-Works, same place.
308,009. Furnace for Annealing Glass and Treating, Annealing, and Tempering Metals. Joseph A. Tatro, Beaver Falls, Pa.
308,027. Rolling-Mill. John S. Worth, Coatesville, Pa.
308,031. Process of Separating the Metals from Copper Matte. John J. Crooke and Robert Crooke, New York City.

GRANTED NOVEMBER 18TH.

308,061. Rotary Air-Compressor. Lewis S. Chicester, Jersey City, New Jersey Assignor to C. M. Edward Schroeder, same place.
308,083. Apparatus for the Manufacture of Ammonia Soda. Benjamin D. Maguin, Nancy, France.
308,108. Mill-Burr. Lorenzo P. Teed and Charles Teed, Erie, Pa.
308,111. Art or Process of and Composition for Making Artificial Stone. James H. Trickey, Hamilton, Ontario, Canada.
308,118. Power Mining-Shovel. George D. Whitcomb, Chicago, Ill.
308,133. Coke-Oven. François Carves, Saint-Etienne, France.
308,152. Process of Extracting the Metal Aluminium. William Frishmuth, Philadelphia, Pa., Assignor to himself, George P. Blanchard, and Emerson Footeboth, of New York City.
308,154. Artificial Fuel and Process of Making the Same. William Griffith, Pittston, Pa.
308,175. Process of Smelting Nickel and Cobalt Ores. Arthur Krupp, Berndorf, Austria-Hungary.
308,182. Machine for Tapping Gas and Water Fittings. Eli J. Manville, Waterbury, Conn.
308,199. Composite Mica Sheet. John L. Rorison, Bakersville, N. C.
308,206. Coal Cleaner. William H. Shepherd, Pittston, Pa.
308,224. Damper for Smoke-Consuming Furnaces. Frederick Whitehead, Cleveland, Ohio.
308,234. Stone-Crusher. Theodore A. Blake, New Haven, Conn.
308,235. Stone-Crusher. Theodore A. Blake, New Haven, Conn.
308,236. Stone-Crusher. Theodore A. Blake, New Haven, Conn.
308,251. Manufacture of Spikes and Machine therefor. Howard Greer, Chicago, Ill.
308,252. Die for and Method of Making Spikes. Howard Greer, Chicago, Ill.
308,253. Process of Making Nails and Spikes. Howard Greer, Chicago, Ill.
308,254. Roller Grinding-Mill. Cyrus T. Hanna, Alleghany, Pa.
308,263. Process of Treating Natural and Artificial Stone. Jacques L. Kessler, Clermont Ferraud, France.
308,276. Process of Manufacturing Illuminating Gas. Henry M. Paine, Newark, New Jersey, Assignor to Bennett Osborn and Henry W. Moorehouse, both of same place.
308,289. Making Ferric Oxide and Sulphurous Acid from Ferric Sulphate. Thomas Terrell, London, England.
308,303. Brick Machine. Charles L. Carman, Chicago, Ill., Assignor, by Direct and Mesne Assignments, to the Carman Brick Machine Company, same place.
308,314. Gas-Making Machine. Williams H. Hutchins, Baltimore, Md.

GRANTED NOVEMBER 25TH.

308,340. Hoisting-Machine. James Boyd, St. Paul, Minn.
308,341. Hoisting-Machine. James Boyd, St. Paul, Minn.
308,349. Blending-Machine for Sheet Metal. Orrin A. Fairchild, Silver Creek, New York.
308,366. Rotary Cutter-Head for Stone-Dressing Machines. James W. Maloy, Somerville, Mass.
308,379. Apparatus for Drawing Wire. Harrison L. Rawson, Worcester, Mass.
308,391. Brick-Kiln. John Weaver, East Liverpool, Ohio, Assignor to himself, George P. Connell, and George C. Kell, all of same place.
308,392. Governor for Steam-Engines. Henry Whiting, Cedar Rapids, Iowa.
308,402. Cork Strip for Protecting Steam and Gas Pipes, etc. Jules Bourdon, Paris, France.
308,405. Apparatus for Casting Ingots of Metal. William F. Durfee, Bridgeport, Conn., and Thomas Egleston, New York City.
308,410. Apparatus for Concentrating Ores. Otto Hanson, Sacramento, Cal.
308,416. Electric Time-Detector. Anatole Lasmoles, Chatteauroux, France.
308,418. Process of and Apparatus for the Treatment of Ores for the Extraction and Separation of their Metals. J. Shedlock, London, England.
308,447. Process of Annealing Wire. Ephraim Tucker, Jr., Worcester, Mass.
308,450. Crown-Bar for Furnaces. Arthur M. White and Thomas W. Hodgson, Rome, New York.
308,451. Barbed Wire for Fences. Charles E. Woodruff and William J. Hutchins, Joliet, Ill.
308,454. Stone-Drill. Thomas M. Yerkes, San Francisco, Cal.
308,484. Spark-Arrester. Carlton Foster, Oshkosh, Wis.
308,500. Spark-Arrester. James A. Jones, Tyler, Texas.
308,510. Apparatus for Disintegrating Ores. Harrison B. Beech, Chatham Village, New York.
308,514. Apparatus for Coking and Collecting the Resulting Gases and their Products. Thomas Nicholson, Hoole, County of Chester, England.
308,518. Natural-Gas Furnace. Joseph N. Pew, Pittsburg, Pa.
308,522. Extracting Oil from Oil-Wells and Oil-Bearing Rock, and Tube therefor. William Richards, Balltown, Pa.
308,523. Rock-Drill. Henry C. Sergeant, New York City.
308,524. Rock-Drill. Henry C. Sergeant, New York City.
308,525. Rock-Drill. Henry C. Sergeant, New York City.
308,546. Metallic Packing. Samuel Armstrong, Newark, New Jersey, Assignor of two thirds to Newton Robinson and Alexander McKirgan, same place.
398,550. Furnace-Door. Thomas R. Butman, Cleveland, Assignor to Jay A. Higbee, Fremont, Ohio.
308,551. Furnace-Door. Thomas R. Butman, Cleveland, Assignor to Jay A. Higbee, Fremont, Ohio.
308,552. Furnace-Door. Thomas R. Butman, Cleveland, Assignor to Jay A. Higbee Fremont, Ohio.
308,557. Roller Grinding-Mill. William R. Fox, Grand Rapids, Mich.
308,563. Vapor-Stove. Walter E. Kauke, Bryan, Ohio, Assignor of one half to Horace A. Willett, same place.
308,564. Gas-Furnace for Metallurgic Purposes. T. G. Kirkpatrick, Leechburg, Assignor to himself and John C. Kirkpatrick, Pittsburg, Pa.
308,565. Regenerator-Furnace for Use of Natural Gas. T. G. Kirkpatrick, Leechburg, Assignor to himself and John C. Kirkpatrick, Pittsburg, Pa.
308,568. Roller-Mill. Thomas W. B. Mumford and Robert Moodie, Victoria Docks, County of Essex, England.
308,572. Gas-Engine. Beaumont Parker, Highland, Kan., Assignor to Lewis C. Parker, Yonkers, New York.
308,573. Petroleum-Vapor Burner. Wilbur H. Peck, Chicago, Ill.
308,577. Brick for Regenerative Furnaces. Samuel A. Richards, Joliet, Ill.
308,584. Amalgamator. Milton T. Van Derveer, Amsterdam, New York.

FINANCIAL.

NEW YORK, Friday Evening, Dec. 19.

The dullness that has prevailed in all business quarters has also made itself felt at the Mining Exchange. The situation remains practically the same as it has been for weeks past, and on the whole the prices have been firm. The sales this week have amounted to 44,100 shares, as against 60,078 shares for the preceding week, showing a decrease of sales of 15,978 shares.

Horn Silver has again been largely dealt in. The price has fluctuated but little, and the last sales were made at $4. It is rumored that the company intends to reduce its production for a time, until better prices for lead and silver can be obtained.

Nevada stocks have been actively dealt in, and sales of almost all the prominent mines of the Comstock lode are recorded. The constant flow of assessments does not seem to check the interest in these stocks. Sutro Tunnel shows the largest business; the sales amounted to 6400 shares, ranging from 10@11c. Consolidated California & Virginia shows sales of 1900 shares; the price has taken a downward course, but has been steady at from 35@32c. Navajo has been the leading Tuscarora stock, and the good condition of the company's affairs accounts for large sales and high prices. The other stocks present no special feature of interest.

Plymouth Consolidated is at present one of the most interesting points of the market. The company's affairs are in a flourishing condition, and the prospects point to a continuation of dividends. The price of the stock remains firm at from $16@$15.50, the sales increase from week to week, and all the elements of a boom are gradually appearing. The company's annual report will be issued after January 1st. The reports from the famous Standard mines show that the last traces of the company's bonanzas are disappearing, and instead of the regular dividends, assessments will no doubt soon be the order. The sales have amounted to 4375 shares. Bodie Consolidated is more fortunate, and is at present the queen mine of the Bodie District; the price remains unchanged at from $2@$2.25, with sales of 1500 shares.

Amie Consolidated and Breece are the only Colorado stocks that show large sales. The other stocks were almost entirely neglected.

The Chrysolite Company has bought the old Taylor & Brunton mill, and will increase its capacity—now limited by the settler capacity to 800—to 1800 tons. The present stamps can crush 1200 tons. These improvements will, it is expected, be completed in a few months, and it is estimated that the mill will make a fair profit per ton on the lump ore.

A complete summary of the market will be found elsewhere.

PIPE LINE CERTIFICATES.

Messrs. Watson & Gibson, petroleum brokers, No. 49 Broadway, report for the week as follows:

The oil market during the past week shows quite a range of prices, and an advance of 10 cents from the lowest of last Saturday to the highest to-day. The market on Friday, the 12th, closed at 72¼c.; but after business hours that evening, the McBride well was torpedoed and started off at the rate of 350 barrels the first hour. The result was, that at the uptown hotels that night oil was freely offered at 69 cents, and on Saturday morning sold down to 68. Heavy buying by those who were already large holders steadied the market, and rallied it to 72⅜c. at the close Saturday night. The McBride well is a half-mile to the southeast of developments at Thorn Creek and the general idea was that, if it proved to be large, we should have lower prices, as it would extend the prolific belt indefinitely in that direction. The fact that the market rallied showed that it was in strong hands. To-day, it broke loose from the intervening period of dullness, and opened 74½c., or ¼c. better than Thursday's close, and sold up to 78¼c., closing at 76¼c. The Producers' Association has bought out, so it is said, the McBride well and 300 acres of contiguous territory, and will shut down development-work there. This fact exercised some influence on the minds of operators who believe that the Standard favors higher prices, and that, notwithstanding unfavorable speculative and industrial conditions, the powers that be will put the market up. Added to this there was a fire at Thorn Creek to-day, destroying some oil, etc., the extent of which is not yet known. The production of that district is now about 10,000 barrels. The McBride is making about 90 barrels an hour.

The following table gives the quotations and sales at the New York Mining Stock and National Petroleum Exchange:

	Opening.	Highest.	Lowest.	Closing.	Sales.
Dec. 13....	$0.70	$0.72¾	$0.68	$0.72⅜	6,477,000
15....	.72¾	.73⅛	.71⅝	.72	4,206,000
16....	.71½	.73¾	.71¼	.73⅜	4,611,000
17....	.73½	.73½	.72¼	.72¾	3,243,000
18....	.72½	.74¼	.72⅝	.74¼	4,510,000
19....	.74½	.78¼	.74½	.76¼	6,402,000
Total sales					29,449,000

MEETINGS.

Brittle Silver Mining Company, No. 18 Wall street, Room 36, New York City, annual meeting of stockholders and election of trustees, December 29th, at one o'clock P.M.

Mount Riga Iron and Mining Company, No. 15 Park Row, New York City, annual meeting of stockholders and election of trustees, January 21st, at one o'clock P.M.

Honduras Mining Company, No. 140 Nassau street, New York City, a special meeting, January 13th, at twelve o'clock M., for the purpose of considering the propriety of increasing the capital stock of the company from $600,000 to $900,000.

Steuben Gold and Silver Mining Company, office of the company's counsel, Sixt Carl Kapff, 23 Park Row, New York City, annual meeting of stockholders and election of trustees, December 29th, at two o'clock P.M.

DIVIDENDS.

Father de Smet Mining Company, of Dakota, has declared dividend No. 40 of twenty cents a share, payable December 31st.

Ontario Silver Mining Company, of Utah, has declared a dividend of $75,000, payable December 31st. Total dividends to date, $6,050,000.

DIVIDENDS PAID BY MINING COMPANIES DURING THE MONTH OF NOVEMBER AND FROM JANUARY 1ST. 1884.

NAME OF COMPANY.	Location of mines.	Paid during month of November.	Since January 1st, 1884.
Adams, S. L	Colo.	$15,000	$60,000
Alice, G. S.	Mont.	50,000	150,000
Atlantic, C.	Mich.		40,000
Bassick, G. S.	Colo.		100,000
Big Bend Hydraulic, G.	Cal.	6,000	18,000
Bodie Consolidated, G.	Cal.		300,000
Bonanza King Con., S.	Cal.		150,000
Bullion, G. S.	Mex.	5,000	5,000
Bulwer Consolidated, G.	Cal.		10,000
California, G.	Colo.		31,500
Calumet & Hecla, C.	Mich.		800,000
Carbonate Hill, S. L.	Colo.		10,000
Catalpa, S. L.	Colo.		30,000
Central, C.	Mich		40,000
Copper Queen, C.	Ariz.		200,000
Cosmopolitan, S.	Utah.		25,000
Derbec Blue Gravel, G.	Cal.		60,000
Dunkin, S. L.	Colo.		10,000
Father de Smet, G.	Dak.	20,000	180,000
Franklin, C.	Mich.		80,000
Hecla Con., S.	Mont.	15,000	195,000
Homestake, G.	Dak.	25,000	275,000
Hope, S.	Mont.		36,000
Horn-Silver, S. L.	Utah	300,000	1,200,000
Idaho, G.	Cal.	23,250	209,250
Iron Silver, S.	Colo.		100,000
Jocuistita, S.	Mex.	50,000	200,000
Kentuck, S.	Nev.		21,000
Leadville Con., S. L.	Colo.		20,000
Lexington, S.	Mont.		240,000
Little Chief, S. L.	Colo.		40,000
Morning Star, S. L.	Colo.		25,000
Moulton, G. S.	Mont.		50,000
Mount Pleasant, G.	Cal.		15,000
Navajo, S.	Nev.	25,000	25,000
Ontario, S.	Utah	75,000	825,000
Original	Mont		27,000
Oro Grande	Cal.		174,860
Osceola, C.	Mich.		62,500
Oxford, G.	N. S.		9,000
Paradise Valley.	Nev.		50,000
Plymouth Con., G.	Cal.	50,000	550,000
Quicksilver, Pref., Q.	"		12,900
Quincy, C.	Mich.		280,000
Rooks, G.	Vt.		31,000
Security, G. S. L. C. & I.	Colo.		50,000
Sierra Bella, S.	N. Mex.		30,000
Sierra Grande, S.	N. Mex.		160,000
Silver King, S.	Ariz.	25,000	25,000
Small Hopes Con.	Colo.	50,000	375,000
St. Joseph's, L.	Mo.		25,000
Standard, Con., G.	Cal.		75,000
Syndicate, G.	Cal.	10,000	60,000
United Verde, C.	Ariz.		60,000
Valencia Mica Co., M.	N. H.		7,500
		$744,250	$7,840,510

G., gold; S., silver; L., lead; C., copper; Q., Quicksilver; C., coal; I., iron; M., mica.

SAN FRANCISCO MINING STOCK QUOTATIONS.

Daily Range of Prices for the Week.

NAME OF COMPANY.	CLOSING QUOTATIONS. Dec. 12.	Dec. 13.	Dec. 15.	Dec. 16	Dec. 17.	Dec. 18.
Albion						
Alpha						
Alta	.15		.20	.20	.20	.20
Argenta						
Bechtel						
Belcher	.50		.50	.60	.60	
Belle Isle						
Best & Belcher	.80	.80	.85	.80	.80	.80
Bodie	2.00	1.87½	1.87½	2.00	2.00	1.75
Bullion						
Bulwer						
Chollar	2.50	2.50	2.50	2.50	2.50	2.50
Con. Pacific	1.00	1.00	1.00	1.12½	1.12½	1.12½
Con. & Cal. Va.	.35	.35	.35	.30	.35	.35
Crown Point	.70	.75	.80	.80		.85
Day						
Elko Cons						
Eureka Cons	2.00					
Exchequer						
Gould & Curry	1.12½	1.12½	1.12½	1.00	1.12½	1.25
Grand Prize						
Hale & Norcross	2.62½	2.62½	2.62½	2.75	2.87½	2.75
Independence						
Martin White	.40					
Mexican	.70	.70	.70	.70	.70	.70
Mono						
Mount Diablo	3.75	3.75	3.75			
Navajo	2.25	2.00	2.00	2.00	2.00	1.87½
Northern Belle						
North Belle Isle						
Ophir	.15	.65	.70	.65	.70	.65
Overman						
Potosi	.80	.80	.85	.90	.90	.90
Savage	1.25	1.25	1.25	1.25	1.25	1.25
Scorpion						
Sierra Nevada	.80	.75	.70	.70	.75	.75
Silver King						
Tip-Top						
Union Cons		.65	.70	.65	.65	.65
Utah	.50	.50	.50	.55		.50
Wales Cons						
Yellow Jacket	.80		1.00	1.12½		1.00

The following are the financial balances of the various mining companies on December 1st:

CASH ON HAND.

Alpha Con	$7,189 49	Crown Point	$22,860.36
Alta	9,241.73	Exchequer	4,244.59
Andes	5,229.10	Gould & Curry	46,067.07
Argenta	4.84	Martin White	4,230.50
*Belcher	15,383.38	Mono	21,809.79
Benton Con	11,156.12	Navajo	92,668.88
Best & Belcher	2,317.84	Occidental	2,943.88
Bodie Con	144,596.86	Potosi	11,051.97
Bulwer	2,518.76	Savage	4,807.23
Con. California & Virginia	2,449.41	Sierra Nevada	39,398.96
		Utah	4,557.42

INDEBTEDNESS.

Chollar	$9,788.00	Mexican	$4,209.90
Grand Prize (overdraft)	39,089.42	Ophir	5,994.78
Hale & Norcross	31,132.54	Standard	2,098.90
Lady Washington Con.	3,544.68	Union Con	13,488.32

* Due Sutro Tunnel Company, $10,920.

Albion indebtedness exact amount not known; approximate, $265,000.

Day, overdraft, $565.16; bills payable, $89,934.68.

Boston Copper and Silver Stocks.

[From our Special Correspondent.]

BOSTON, Dec. 18.

There is no improvement to note in the market for copper stocks, but on the contrary, prices continue to droop, and the prospect is not an encouraging one. Ingot copper is weak at 12 cents, and the breaking up of the pool by the action of the Quincy Company tends to unsettle the market, and lower prices for the copper stocks are confidently predicted. Calumet & Hecla show a decline of $2 this week, with sales at $142. Quincy has been quite firm, and in the early part of the week showed an advance of $1 to $29, but later sales were back again to $28, with stock now offered at that price, and $27 as the best bid. Atlantic declined to $6 on sale of 50 shares only; and Franklin sold at $6¼, a decline of ¾ from last sale (4th inst.). The stock is now $6 bid, and none offered. Osceola is offered at $9, and Pewabic at $1¼, and there is no bid for either at present.

In silver stocks, there is no activity, the market being almost entirely neglected. Bowman is heavy with sales at 11c., assessment paid. Dunkin sold at 21@22c. Catalpa, 24@25c. Consolidated Pacific is in better demand, and is about the only stock showing an advance; sales $1.10@$1.15. Water-meter stocks heavy and neglected.

3 P.M.—At the afternoon Board, there was nothing done. Quincy, $27½ bid, $28 asked. Calumet & Hecla, $142. Franklin, $6 bid, $7 asked.

BULLION MARKET.

NEW YORK, Friday Evening, Dec. 19.

The market abroad and at home continues quite nominal under an apprehension that the present Congress may stop the coinage of the standard dollar.

DATE.	London.	N. Y.	DATE.	London.	N. Y.
	Pence.	Cents.		Pence.	Cents.
Dec. 13	*	106¾	Dec. 17	49⅛	107⅛
15	49⅛	107	18	49⅛	107⅛
16	49½	107	19	49 9-16	107⅛

*49¼@49⅜.

Foreign Bank Statements.—The governors of the Bank of England, at their regular weekly meeting, made no change in the bank's minimum rate of discount, and it remains at 5 per cent. During the week, the bank gained £227,000 bullion; and the proportion of its reserve to its liabilities was reduced from 41 3/16 to 40½, against 43 1/16 per cent at this date last year. The weekly statement of the Bank of France shows a loss of 5,750,000 francs gold and a gain of 2,075,000 francs silver. The Imperial Bank of Germany's weekly statement shows a loss in specie of 1,360,000 marks.

BULLION PRODUCTION FOR 1884.

MINES.	States.	Month of November.	Year from Jan. 1st, 1884.
		$	$
*Alice, G. S.	Mont.	93,410	1,136,116
*Belmont	Mont.	10,767	57,572
*Black Bear, G	Cal		19,600
Bodie, G	Cal	84,038	493,822
*Bonanza King, G.	Cal		191,891
*Boston & Montana, G.	Mont.		362,489
*Caledonia, G.	Dak.		73,511
*Chrysolite, S. L.	Colo.	5,973	137,514
*Consolidated Bobtail, G	Colo.		79,030
*Contention, S. G.	Ariz.		293,607
*Deadwood-Terra, G.	Dak.		423,918
*Derbec Blue Gravel, G. S.	Colo.	12,335	144,659
*Father de Smet, G.	Dak.	39,389	431,308
*Grand Prize, S.	Nev.	37,101	111,776
*Hecla Cons., G. S. L. C.	Mont.		972,952
*Helena, G. S. L. C.	Mont.		941,036
*Homestake, G.	Dak.		1,059,754
*Hope, S.	Mont.		70,472
Horn-Silver, S. L.	Utah.	228,000	2,371,087
*Iron Silver, S. L.	Colo.		606,472
*Kentuck, G. S.	Nev.	438	22,849
*Lexington, G. S.	Mont.	59,923	1,058,032
*Little Pittsburg, S. L.	Colo.	1,997	79,091
*Mammoth Bar, G.		2,908	4,799
*Moulton, G. S.	Mont	56,491	733,095
*Mount Diablo, S.	Nev		24,820
*Murchie, G. S.	Cal		19,000
*Navajo, G. S.	Nev.	56,792	439,381
*New Pittsburg, S.	Colo.		51,224
*North Belle Isle, S.	Nev.		5,874
*Ontario, S. L.	Utah.	191,857	2,008,000
*Original, S. C.	Mont.		29,724
*Oxford, G.	N. S.	2,050	35,142
*Paradise Valley, S. G.	Nev.		103,950
*Plymouth Consolidated, G.	Cal.	86,918	945,828
*Rooks, G.	Vt.	6,779	55,434
*South Yuba, G.	Cal.		22,708
*Stormont, S. L.	Utah.	13,134	146,637
*Syndicate, G. S.	Cal.	10,006	111,276
*Tombstone, S. L.	Ariz.	66,661	517,433
United Gregory, G.	Colo.		7,174
Total amount of shipments to date			$16,394,646

* Official. † Assay value. ‡ Not including value of lead and copper; G., gold; S., silver; L., lead; C., copper. —— No bullion produced. Silver valued by the different companies from $1.05@$1.29·29 per ounce; gold, $20.67.

METALS.

NEW YORK, Friday Evening, Dec. 19.

Copper.—The market is thoroughly demoralized by the happenings of the past week, and there have been sales of Lake copper at 11⅛@11¼c., and even below this under exceptional circumstances. It would be impossible to quote other brands higher than 10⅛@10⅝c.

Chili Bars have gone as low as £47 7s. 6d. during the week, but have rallied, according to the latest advices, to £47 17s. 6d.@£48, the latter being the last figure we have heard of. Best Selected is cabled at the close £55.

Messrs. James Lewis & Sons report, under date December 1st:

Arrivals from the United States have again been on a very limited scale—only 1206 tons. On the other hand, the consumptive demand, especially for Birmingham, has fallen off. The competition of American and other ingot copper has materially affected the value of English Best Selected, and unless English smelters are willing to pay better prices for American ore and matte than they at present offer, we may look to see ere long chief part of the American production arriving here in the form of bars and ingots, and India supplied directly with American sheet copper.

The abstention of smelters from purchases of furnace material has been a noticeable feature during the month. Six thousand tons of Rio Tinto regulus of about 30 per cent have, however, been sold for delivery here at the rate of 500 tons monthly, at a price based on that of Chili Bars at the time of delivery, and a considerable quantity of American copper matte for forward delivery at 10s. per unit.

The sales of furnace material have been:

Tons.		Per cent.		Per unit.
150	Ore, N. Quebrada (Yel).	8	Liv.	9s 6d
507	" Italian	10	"	9s 3d
352	Matte, " ex Druid	40	Swa.	10s 3d
137	Prec, Mason's		Liv.	10s 1½d
520	Matte, Rio Tinto	30	"	Pt. t'rms.
150	Ore, Italian	10	"	9s 1½d
25	Prec, English			10s 7½d
150	Ore, Italian	10	Liv.	9s 1 7d
90	Prec, Mason's		"	10s 1½d
50	" "		"	10s 1½d
60	" Rio Tinto (B. S.)	90	"	11s 1½d
900	Mun, Libeola		Swa.	9s 1½d
25	Prec, " (B. S.)	90	Lon.	11s 1½d
34	Matte, "	40		9s 6d
700	Ore, Cape	30	Swa.	10s 3d
100	" N. Quebrada (Yel.)	10	Liv.	9s 3d
300	Matte, Rio Tinto	30	Swa.	Pt. t'rms.
500	" " "	30	"	9s 0d
200	Ore, Carracedo		"	9s 0d
50	Prec, English			10s 4½d

Imports of other than Chili copper (tons fine) into Liverpool and Swansea during the first eleven months of the following years in tons fine:

	1882.	1883.	1884.
From United States	645	7,996	15,851
Canada	279	427	266
Mexico	322	467	291
Peru	821	394	387
River Plate	238	319	116
New Quebrada	3,120	3,647	3,395
Newfoundland	1,262	1,185	224
Spain	438	2,372	2,515
Portugal		129	230
Italy	1,255	875	845
Norway	446	267	289
Cape of Good Hope	4,947	5,290	5,514
Australia	112	160	446
Sundries	829	879	251
Precipitate	8,084	9,863	8,917
	22,798	34,270	39,537

Messrs. James & Shakspeare have published the following statistics for September:

		—Nov. 1 to 30.— Imports. Tons.	Deliveries. Tons.	
Fine foreign, chiefly Australian		938	994	London.
Chili	Bars	1,085	1,033	
	Ingots	246	197	
	In ores and regulus	718	394	Liverpool and Swansea.
American, chiefly furnace material		1,206	1,179	
Spanish precipitate and sundries		1,874	1,840	
Totals—England		6,067	5,637	
American, chiefly ingots		865	965	
Chili bars, ingots, and Barilla		886	707	France.
Sundries		45	30	
England and France		7,863	7,339	
		—Stocks.— Nov. 30. Tons.		
Fine foreign, chiefly Australian		2,438		London.
Chili	Bars	22,644		
	Ingots	49		Liverpool and Swansea.
	In ores and regulus	720		
American, chiefly furnace material		755		
Spanish precipitate and sundries		3,910		
Totals—England		30,516		
American, chiefly ingots		615		
Chili bars, ingots, and Barilla		1,188		France.
Sundries		15		
Totals—England and France		32,334		

Advised by mail and telegram:

	Tons.
Chili	9,200
Australian	2,000
Total visible supply	43,534

		Jan. 1 to Nov. 30. Tons. 1884.	Tons. 1883.	Tons. 1882.
Total	Imports	92,157	87,246	71,817
	Deliveries	99,666	84,718	74,454

Tin.—The last business has been done on the basis of 16·25@16·30c. for Spot Straits, England cabling £73 17s. 6d.

Lead.—The market has been very quiet and closes a shade firmer at 3·60@3·65c. for Common and 3·70c. for Refined. One lot of 100 tons of Newark was sold during the week for 3⅝c., but was an exceptional transaction. England cables lead improved to £11 for Soft Spanish.

Messrs. Everett & Post telegraph us as follows today from Chicago:

Our market is quiet and dull, being nominally 3·40c.

Messrs. John Wahl & Co., of St. Louis, send us the following dispatch to-day:

Our market has remained about the same, if any thing a shade firmer. Although not yet apparent through larger dealing, the improved opinion as to the immediate future of this metal has, if any thing, been gaining ground during the week, and the market is now firm at 3·40c. for Chemical and 3·45c. for Corroding lead. Our consumers' stocks are light, and they are beginning to look around for some lead. Holders are stiff, and will not sell excepting in a retail way.

Spelter.—There have been no new developments, and prices still remain 4⅛c. for common Domestic, with some of the Western producers energetically claiming that they can not produce at that figure. England cables £14 2s. 6d.

Antimony.—There is nothing new.

IRON MARKET REVIEW.

NEW YORK, Friday Evening, Dec. 19.

American Iron.—The placing of contracts for delivery during the next year continues, and the sales are said to be large in the aggregate, and the lower prices are now generally established. We quote $18@$18.50 for No. 1 Foundry; $17@$17.50 for No. 2; and $16@$17 for Gray Forge, standard brands, tidewater delivery, with the usual lower figures for outside brands, which, however, are now unfavorably placed. Bessemer pig is dull, with Foreign nominally quoted $19, while bids do not go higher than $18.50. There has been some business in Spiegeleisen, which we quote $30 for 30 per cent, $26 for 20 per cent, and $22 for 10 to 12 per cent.

Scotch Pig.—Some of the iron coming in is going into store. We quote ex ship and to arrive: Coltness, $21.50; Langloan, $21.50; Gartsherrie, $21; Summerlee, $20.50@$20.75; Eglinton, $19@$19.25; and Glengarnock, $19.50.

At the Metal Exchange, the following cables were received to-day: Coltness, 56s. 6d.; Langloan, 57s.; Summerlee, 53s.; Gartsherrie, 52s. 3d.; Glengarnock, 49s.; Dalmellington, 48s.; and Eglinton, 43s. 6d. Warrants were cabled 42s. 5d. to-day.

Steel Rails.—The market has been quiet but firmer, $28 being the lowest quotation.

Old Rails.—We quote $16.50@$17.

Philadelphia. Dec. 19.

[From our Special Correspondent.]

The movements in iron possess but little interest although more business was done this week than any one week for several weeks past. A preference has been shown for finer makes of iron, which have been offered at prices heretofore asked for more ordinary brands. The rolling-mills throughout the State have run down, and scarcely any force is needed, especially in view of the agitation going on for lower prices. The makers of Southern iron have been endeavoring to close some contracts, and have partly succeeded; but at the prices that Pennsylvania furnaces are offering, there is not much prospect of outside iron making a permanent impression. Good Forge iron is offered to-day by brokers, at $14@$14.50, at furnace. So far as known, there have been no heavy transactions, notwithstanding rumors that there were. The outlook is not encouraging; but the fact is, none of the mills has any stocks of any kind for winter's work.

Foreign Iron.—Bessemer is nominally $18.50@$19; Spiegel, $26 for 20 per cent, $31 and $32 for 30 per cent.

Manufactured Iron.—The store-keepers report every thing flat, but profess to have confidence that buyers will be along in force soon. Quotations are $1.80 for Refined and $1.60 for Common.

Nails.—Nails are $1.95@$2.05. Demand moderate, but production a little too much for satisfactory prices.

Structural Iron.—In regard to construction iron, there is nothing doing worth speaking of, and hence there is nothing new in prices. The mill-owners would, no doubt, make very good terms for large orders.

Sheet-Iron.—The mills have very considerably restricted their production, and the stores here have shipped very little for a week.

Wrought Pipes.—No orders of consequence have come to hand, and the inside figures reached lately are not likely to change.

Merchant Steel.—Some few lots of tool steel were placed yesterday.

Steel Rails.—An insignificant amount of business was done in the neighborhood of $28. Heavy orders might be taken at $27.50; but for any thing below, it would be necessary to look up other makers than are here.

Old Rails.—The market is quiet, but prices seem to

NEW YORK MINING STOCKS.

DIVIDEND-PAYING MINES.

NAME AND LOCATION OF COMPANY.	HIGHEST AND LOWEST PRICES PER SHARE AT WHICH SALES WERE MADE.												SALES.
	Dec. 13.		Dec. 15.		Dec. 16.		Dec. 17.		Dec. 18.		Dec. 19.		
	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	
Alice, Mon.	.....	.....	2.30	.....	.....	.....	.....	.....	2.40	2 30	.....	.....	500
Amie Con., Co.	.....	.....	.04	.....	.03	.....	.03	.....	.03	.....	.03	.....	6,400
Argenta	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Bassick, Co.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	4.25	.....	25
Belle Isle, Ne.	.....	.....	.....	.....	.20	.....	.....	.....	.....	.....	.....	.....	800
Bodie Cons., Ca.	.....	.....	2 00	.....	2.20	.....	2.25	2.20	2.10	.....	2.15	2.05	1,500
Breece, Co.	.....	.....	.....	.....	.....	.....	.26	.18	.18	.17	.....	.....	2,300
Bulwer, Ca.	.31	.28	.....	.....	.30	.....	.....	.....	.....	.....	.....	.....	1,000
California, Ne.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Cal. & Hecla, Mich.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Castle Creek	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Chollar	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Carysolite, Co.	1.00	.....	1.05	.....	.75*	.....	.....	.....	.85	.82	.75	.....	1,000
Cons. Cal. & Va.	.35	.....	.....	.....	.32	.....	.....	.....	.....	.....	.....	.....	1,900
Cons. Va., Ne.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Dunkin, Co.	.25	.24	.25	.....	.....	.....	.....	.....	.....	.....	.....	.....	600
Eureka Cons., Ne.	2.30	..	2.35	.....	.....	.....	2 15	.....	.....	.....	1.90	1.85	825
Father de Smet, Dk.	.....	.....	..	.....	.....	.	4.50	.....	4 50	.....	..	.....	200
Findley, Ga.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Gold Stripe, Ca.	.....	.....	.....	.....	.....	.....	..	.....	.....	.....	.....	.....	.....
Gould & Curry, Ne.	.....	.....	.....	.....	.....	.....	1.00	.....	.....	.....	.....	.....	200
Grand Prize, Ne.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Green Mountain, Ca.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Hale & Norcross, Ne.	.....	.....	.....	.....	.....	.....	.....	.....	3.00	2.80	.....	.....	500
Hall-Anderson, N. S	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Homestake, Dk.	.....	.....	9.50	.....	.....	.....	.....	.....	10.00	.....	.....	.....	35
Horn-Silver, Ut.	3.95	.....	4.25	3.95	4.00	3.95	4.00	.....	4 00	.....	4.00	.....	3,810
Independence, Ne.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Iron Silver, Co.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Leadville C., Co.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Little Chief, Co.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Little Pittsburg, Co.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Martin White, Ne.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Moulton	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Navajo, Ne.	2.50	2.35	2.30	2.05	2 00	.....	2.05	.....	2.05	.....	2.05	.....	2,000
Northern Belle	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
North Belle Isle, Ne.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Ontario, Ut.	.....	.....	.....	.....	18.00	.....	.....	.....	18.50	.....	.....	.....	65
Ophir	.....	.....	.....	.....	.....	.....	.73	.....	.70	.....	.....	.....	900
Plymouth	15.63	15.38	15.63	15.50	15.50	15.38	.....	.....	15.75	.....	16.00	15.88	2,495
Quicksilver Pref., Ca.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
" Com., Ca.	.....	.....	.....	.....	5.00	.....	.....	.....	.....	.....	.....	.....	100
Robinson Cons., Co.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Savage, Ne.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Sierra Nevada, Ne.	.80	.75	.....	.....	.80	.....	.....	.....	.80	.....	.....	.....	850
Silver King, Ar.	5.00	.....	5.00	.....	.....	.....	5.50	.....	.....	.....	5.38	.....	650
Spring Valley, Ca.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Standard, Ca.	.61	.59	.60	.55	.69	.55	.62	.58	.62	.57	.60	.56	4,375
Stormont, Ut.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Tip Top, Ar	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Yellow Jacket	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....

NON-DIVIDEND-PAYING MINES.

NAME AND LOCATION OF COMPANY.	HIGHEST AND LOWEST PRICES PER SHARE AT WHICH SALES WERE MADE.												SALES.
	Dec. 13.		Dec. 15.		Dec. 16.		Dec. 17.		Dec. 18.		Dec. 19.		
	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	
Albion	.10	.....	.09	.....	.....	.....	.....	.....	.....	.....	.....	.....	800
American Flag	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Barcelona, G.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Techtel Con., G.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Belvidere	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Best & Bicher, G. S.	1.25	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	50
Big Pittsburg, S. L.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Bradshaw, S.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Bull-Domingo, S.L.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Cal., B. H., G.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Central Ariz'na, S.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Climax, Co.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Colorado Central.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Cons. Imperial	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Con. Pacific	1.10	.....	1.10	.....	1.10	1.05	1.15	.....	1.10	.....	1.10	.....	2,800
Decatur	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Durango, G.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Eastern Oregon	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Goodshaw, G.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Harlem M. & M. Co.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Hortense, S.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Lacrosse, G.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Mariposa Pref., G.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
" Com., G.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Mexican, G. S.	.....	.....	.....	.....	.....	.....	.65	.60	.....	.....	.....	.....	300
Mono	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
North Standard, G.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
N. Horn-Silv'r, S L.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Ori'nt'l & Miller, S.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Rappahannock, G.	.04	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	100
Red Elephant, S.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Ruby, of Arizona	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Silver Cliff, S.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Sonora Con.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
South Bodie, G.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
South Bulwer, G.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
South Hite	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
South Pacific	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
State Line, 1 & 4, S.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
" Nos. 2 & 3, S.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Sutro Tunnel	.11	.....	.....	.....	.11	.10	.....	.....	.....	.....	.10	.....	6,400
Taylor Plumas	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Unadilla, S	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Union Cons., G. S.	.....	.....	.70	.....	.80	.....	.....	.....	.70	.....	.....	.....	460
	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....

Tables giving dividends and assessments will be printed the first week of each month. Dividend shares sold, 33,090. Non-dividend shares sold, 11,010. *Ex-dividend.

be a little firmer, especially on the business done, which will amount to a few hundred tons.

Scrap.—The market is quiet.

COAL TRADE REVIEW.

NEW YORK, Friday Evening, Dec. 19.

Anthracite.

The event of the week has been the publication of the fact that the Lehigh Valley Company had made a bid for the contract for the coal of the elevated railroads for the coming year, naming $3.04 as the price. This contract, which is the largest single contract in the country, amounting to 140,000 tons, has been filled for the last five years by the Lehigh & Wilkes-Barre Coal Company which was awarded it for the current year at $4. The requirements of the road demand that coal of exceptionally good quality be used, and the Lehigh & Wilkes-Barre Coal Company has always contracted to deliver the well-known Plymouth coal, which is said to be peculiarly well adapted to the service. The bid of the Lehigh Valley Company has not yet been accepted, but it has had the salutary effect of rousing the coal companies to action. It did not take much figuring to ascertain that such an open drop of nearly $1 per ton meant a decline in the receipts of all the companies of a very heavy sum of money equal to more than the entire dividends paid by those of the companies which are fortunate enough to earn them. The immediate result has been, that for the first time in a long time, the coal presidents have consented to meet and discuss the situation. As we write, this meeting is now going on in Philadelphia, and the first fruits of it are, that a committee of three gentlemen, Messrs. Harris, Gowen, and Hoyt, have been appointed a committee to fix upon the percentages in the allotment. The meeting then adjourned, as we are informed by telegraph, to meet in a week, to report the details of its work in connection with the percentages. We understand that during the last few days the feeling among the companies was strongly in favor of the figures worked out by Mr. Harris. His averages of actual ratios of productive capacity are said to be based on a very careful examination.

The committee appointed is spoken of by coal men here as a very strong one, and a good deal of confidence is felt in its ability to give a fair representation to all interests. One very important feature is, that the Pennsylvania Railroad has participated in the discussions. The meeting, as we are informed by wire, was harmonious, and we feel confident that it will result in the adoption of a plan that will put a stop to the present ruinous system.

Mr. John H. Jones, official accountant, has published the following statement of the anthracite coal tonnage for the month of November, 1884, compared with the same period last year. This statement includes the entire production of anthracite coal, excepting that consumed by employés, and for steam and heating purposes about the mines :

	Nov. 1884.	Nov. 1883.	Difference.
Phila. & Reading RR.	1,159,606	1,242,399	D. 82,794
Lehigh Valley RR.	†592,316	623,843	D. 31,527
Del., Lack. & West. RR.	509,750	489,769	I. 19,982
Del. & Hud. Canal Co.	‡310,466	378,634	D. 68,168
Pennsylvania RR.	267,444	268,838	I. 1,394
Pennsylvania Coal Co.	130,720	155,488	D. 24,769
N. York, L. E. & W. RR.	61,652	39,122	I. 22,531
Total	3,031,954	3,198,093	D. 166,140

	For Year 1884.	For Year 1883.	Difference.
Phila. & Reading RR.	10,282,172	*11,477,484	D. 1,195,312
Lehigh Valley RR.	5,429,984	5,849,307	D. 419,324
Del., Lack. & West. RR	4,727,986	4,708,419	I. 19,567
Del. & Hud. Canal Co.	3,067,506	3,288,977	D. 221,471
Pennsylvania RR.	2,927,172	2,557,625	I. 369,547
Pennsylvania Coal Co.	1,266,927	1,432,170	D. 165,243
N. York, L. E. & W. RR.	385,810	345,904	I. 19,905
Total	28,087,557	29,659,886	D. 1,572,329

* This amount includes 1,745,398 19 tons carried by the Central Railroad of New Jersey during the first five months of 1883.

† This amount includes the production of the mines of the State Line & Sullivan Railroad Company, amounting to 9010 tons.

‡ In addition, there were 71,098 tons transported from mines by the Delaware & Hudson Canal Company, during November, which is included in the tonnage of other interests.

The stock of coal on hand at tide-water shipping points, November 30th, 1884, was 712,392 tons; on October 31st, 1884, 781,810 tons; decrease 69,418 tons.

Philadelphia. Dec. 19.

[From our Special Correspondent.]

It is difficult to harmonize the statements made through the course of the year, as to the condition of the coal trade and its prospects, with the footings of production and shipment at the end of the year. This year's production is surprising, considering the depression in the industries, and considering that buyers are not carrying heavy stocks as formerly. The business, just at present, may safely be called quiet. There are large stocks at Port Richmond, most of it of manufacturing sizes. Next week will be an idle week, and this fact, with the large orders to be filled next week, for both Eastern, South Atlantic, and gulf ports, will very greatly decrease the stocks there. The coal trade is suffering from too much vigor in the productive capacity. The new programme has not yet been announced. Possibly it may not be announced or agreed upon for sixty days. It is admitted that there are some serious difficulties to be presented, due to excessive capacity and to the necessity for a greater production and traffic than the market will stand. Your correspondent has endeavored to probe the situation, but finds that the representatives of the companies are not yet in harmony, but they believe there will be a satisfactory agreement within thirty days. A great many rumors are afloat as to what the new programme will be. It seems to be probable that a good many of the least profitable mines will be neglected; but this, if adopted, would hurt some companies more than others. The allotment system is preferred at present. The Reading companies have announced definitely their intention of remaining in the combination, upon the basis of 30,000,000 tons, the agreement to go into effect February 1st; and it is understood that the Pennsylvania and Lehigh Valley companies will also remain in the combination. It is said by a few parties here, who usually know what they are talking about, that the whole programme has been definitely agreed upon, and that only some minor, unimportant details remain to be fixed up. The reported contract of 500,000 tons to the Manhattan Railroad Company, at $3.05 against $4, the old price, occasioned a great deal of street and office talk. These figures are regarded as doubtful, and Mr. Newton, the agent of the Lehigh Company here, gave a positive denial to any and all rumors of the cutting of future contracts. Rumors of shadings, actual or contemplated, are afloat, and must have some sort of foundation, although it is impossible to find out where the trouble comes from. There are several good rich contracts to be secured; and if there is a loop-hole left, it is probable that advantage will be taken by making savage cuts. The local demand is steadily improving. The line trade is about as it has been; the interior manufacturing demand is

very light. The Eastern Pig-Iron Association will probably take some action on Friday, in reference to the fuel question, and endeavor to bring at least some general influence to bear that will induce the anthracite managers to reduce prices to some more reasonable basis.

A cave-in occurred on Wednesday morning at No. 11 mine of the Lehigh and Wilkes-Barre Company, near Plymouth. Three acres sank five feet, causing a loss of $30,000 to machinery, etc.

Vessels are in demand and freights are high. The bituminous trade is attracting a good deal of attention. Several railroad conferences have been held to determine on the pooling of tide-water bituminous. Four railroads are concerned—the Pennsylvania, the P. & O., the Reading, and the Lehigh Valley. The latter three would like combinations, the first is indifferent, as only 2,500,000 tons of coal and coke out of a total of 14,000,000 tons, reached tide-water.

Meetings are arranged for next week, and the representatives of various companies are now working up the basis of agreement. The scare of Southern iron coming into Northern markets has been followed by an attempt at a scare of Southern coal; but there is very little danger of this, as the Pennsylvania Company has 225 miles to haul to Baltimore, whence coal can be cheaply taken to Norfolk, as against a 375-mile haul on the Norfolk & Western, and 440-mile haul of the C. & A. to Norfolk.

Buffalo. Dec. 18.

[From our Special Correspondent.]

The business transacted in coal and coke at this port is now confined to local requirements and car-lot trade to interior points and to Canada. Prices nominally unchanged. Railroad freights will bear readjustment, and measures looking to a change in rates are under consideration.

The traffic of the Rochester & Pittsburg Railroad is reported to be exceptionally good at present. During November, 55,000 tons of coal were hauled; this month, the movement is equally large.

Another blizzard prevailed here last Monday; wind, 60 miles an hour for several hours, and for a few minutes 72 miles; great damage was done; trestles washed away; the sea-wall destroyed in several places, inundating the flats and the Tifft farm works of the Lehigh Valley Railroad; several vessels torn from their moorings, and the railroad tracks alongside the Erie breakwater rendered impassable, with trains delayed in consequence. The following newspaper account of the gale may interest your readers, many of whom perhaps have but little knowledge of this locality: "The most terrific gale that has visited this city in years came swooping down from the Mississippi Valley Monday morning, rolling up the lake into gigantic billows, filling the air with splintered limbs and flying shingles, and creating the greatest atmospheric commotion seen in this region of raging winds in many a day. Beginning early in the night, the wind gradually freshened, and from five o'clock in the morning until nine it raged with almost unparalleled fury, at one time reaching the remarkable speed of seventy-two miles an hour. Every thing movable was compelled to succumb, and, for a time, walking on the streets was attended with as much difficulty as swimming against the current of Niagara. Along the lake shore, a scene akin to grandeur was presented. At the island, the great waves, which came rolling in with irresistible power, swept over the break-water upon the roofs of the cottages in vast volumes, which crushed them in like egg-shells and forced the occupants to flee for their lives. The spray dashed a hundred feet in the air, and where the force of the waves had demolished the stone wall, a heavy sea rushed through, flooding the island with water to the depth of three or four feet. It was such a scene of devastation and ruin as must characterize the bursting of the dikes in Holland. The domiciles of Joseph Mark, William Connor, and Mrs. Swanson were completely demolished. The kitchens in the rear of the houses of Frederick Klokke, Mrs. McNamarra, William Dusler, Michael Hoolihan, and Matthew Boardman were crushed in; the homes of Mrs. Newman, Mr. O'Brian, Mr. Hagarty, Joseph Meyers, Frank Kilcourse, Mrs. Chambers, and John Foley were desolated by the flood, while every other habitation on the island suffered more or less damage.

"The water in the river and canal arose to a hight hitherto almost unknown, and at six o'clock at the foot of Main street it was on a level with the wharf. Many cellars were flooded; lumber-yards were set afloat, and much other damage done. Among the shipping, all was commotion. Vessels ground against the wharves and tugged at their moorings like wild animals straining their fetters. The propeller John B. Lyon and the schooner J. M. Hutchinson, lying in the Blackwell Canal, parted their stern lines and were driven across the channel, but fortunately escaped serious damage. A canal-boat belonging to Arthur Bissell broke its cables at Genesee street, and started on an independent trip down the canal. Two canal-boats and a tug, lying under the Commercial street bridge, were wedged in by the rising water and at one time threatened to raise the structure from the foundations. The Falls trains were unable to run across the trestle, and were compelled to resort to the belt line to reach the Central depot. About 100 feet of the trestle finally succumbed to the fury of the waves, and went down into the boiling sea. As soon as the wind moderated, however, a gang of men were set to work to repair the damage, and this morning the trains will run as usual."

The annual statistics of the coal trade are now in course of preparation. I will send you early information of the details.

Chronic grumblers have come to the front again, as usual, and raise a clamor for the *abandonment* of the canals of the State. It would be a folly and a crime to do so. The movement thereon for the past season was not as large as the one preceding; but there were good and sufficient reasons for the decline in tonnage. The Utica *Herald*, in a forcible article, uses the following language, which the grumblers will do well to consider carefully, and govern themselves in accordance therewith: "We held that if the Erie Canal, under the no-tolls system, was able to retain the great bulk of the commerce that had previously sought it, it would be worth the while of the State to pay the cost of maintaining the canals, simply for the sake of furnishing that commerce a free transit through our State and into our harbors. We hold to this position still; and the fact that the commerce of the Erie has declined, in an exceptional year, does not, in our judgment, afford a reason why we should abandon it. The State of New York is the wealthiest in the Union. Its tax levy is low, and will be much lower in the immediate future; for one year more of a million dollars annually poured into the new capitol ought to bring that stupendous extravagance to completion. With that load lifted from the shoulders of the tax-payers, they will find it an easy burden to maintain the Erie, costing less per annum than we have paid into the new capitol for the last ten years, until such time as the experiment of toll abolition shall have had the fullest trial its most earnest friends can ask."

Coal operators are said to be not feeling at all comfortable in their minds just now as to the prospects of trade for the new year. They say that the mild season, depressed condition of trade, and decline in manufactures all conspire to indicate dull times. It is also asserted that rates are cut to a considerable extent. One dealer is credited with saying, "I am certain that the cutting in anthracite to-day is full 50 cents under the wholesale circular."

One of our public buildings is using for its furnaces for heating and making steam a mixture of "buckwheat" and slack coal; it makes but little clinker when used in specially arranged grates, and burns quite freely. The cost is about $1.50 a ton delivered at this point.

I wish your readers a merry Christmas and a happy New Year.

Boston. Dec. 18.

[From our Special Correspondent.]

The continued scarcity of stove coal at this port enables the jobbers to maintain the price at $4, f. o. b., at New York, and Philadelphia prices are also unchanged. There is a little easier feeling in broken coal, and while we still quote f. o. b. prices of $3.25 at Philadelphia, and $3.50 at New York, it is likely that free broken can be had at concessions from these figures. Smaller sizes, with the exception of stove, are dull and inclined to weakness, as the demand is small.

Sensational rumors from Wall Street have recently been afloat to the effect that there had been a decline of 25 cents a ton in anthracite coal, and that a new plan of restriction had been agreed upon. Of course, such a report, like nearly all from that source, has little or no foundation. It is only in line with present Wall Street fashion of bearing coal. However, the ground of these bearish attacks, namely, that the price of coal has been artificially maintained, while almost every other household necessity has declined, is worthy of consideration. A feeble and hesitating policy on part of the companies for next year is likely to cause a decline, especially if the winter should continue unfavorable for a large consumption. The suspension for Christmas week amounts in reality to only three days' genuine restriction. The Christmas holidays always break up the week.

We quote f. o. b. prices as follows:

At New York, Stove, $4@$4.15; Broken and Egg, $3.50@$3.65; Pea, $2.40; individual coals, $3.90 for Stove, $3.25@$3.50 for Broken and Egg. At Philadelphia, $3.90@$4 for Stove, $2.20 for Pea, $3.30@$3.50 for Broken and Egg. Special coals, $4.85@$5 for Broken, $5.35@$5.50 for Stove.

There is no movement of importance in bituminous coal. There is no change from the previously expressed opinion that the trade will come slowly. It will be borne in mind that the price of bituminous coal, delivered, has declined one dollar a ton since last season opened. Many contracts were made on which there was a subsequent market decline of from 35 to 50 cents a ton, and this is a matter of importance in some large contracts. It is estimated that the Eastern Railroad, which was the first to enter this market, last year, at about this date, must have lost about $20,000, compared with the lowest prices, unless a rebate was allowed them. Such little things naturally cause a tendency to hang back, although the early buyer may fare best in view of the existing very low figures. This does not seem probable, however. Transient sales are quoted at $3.55@$3.70, delivered.

There is a little firmer feeling in freights as the close of navigation is nearing. We quote: New York, 95c.@$1.10; Philadelphia, $1.20@$1.25; Baltimore, $1.20; Newport News, $1.15@$1.20; Richmond, $1.25; Cape Breton, $1.55@$1.60; Bay of Fundy, $1.30@$1.40.

Retail trade is dull, considering the usual movement during the month. It is owing to the unusual weather. Prices are unchanged. We quote:

White ash, furnace and egg	$5.25@ 5.50
" " stove and nut	5.50@ 5.75
Red ash, egg	6.00
" " stove	6.25
Lorberry, egg and stove	6.50@ 6.75
Franklin, egg and stove	7.50
Lehigh, furnace, egg, and stove	5.50@ 5.75
" nut	5.75

Wharf prices, $4.50 for Broken, $4.85 for Stove.

STATISTICS OF COAL PRODUCTION.

Comparative statement of the production of anthracite coal for the week ended December 13th, and year from January 1st:

TONS OF 2240 LBS.	1884.		1883.	
	Week.	Year.	Week.	Year.
Wyoming Region.				
D. & H. Canal Co.	108,075	3,788,849	48,275	3,975,630
D. L. & W. RR. Co.	130,267	4,960,612	87,322	4,874,475
Penna. Coal Co.	28,570	1,269,242	18,098	1,443,909
L. V. RR. Co.	27,438	1,329,991	34,168	1,363,134
P. & N. Y. RR. Co.	4,590	215,075	3,409	210,269
C. RR. of N. J.	*	*	*	1,202,078
Penn. Canal Co.		430,708		486,663
North & West Br. RR.	25,780	804,962	15,638	500,582
	324,720	12,709,439	206,850	14,056,740
Lehigh Region.				
L. V. RR. Co.	120,004	4,495,384	59,289	4,846,819
C. RR. of N. J.	*	*	*	1,126,889
S. H. & W. B. RR.	722	139,293	4,235	43,614
	120,726	4,634,677	63,524	6,017,322
Schuylkill Region.				
P. & R. RR. Co.	248,493	10,879,038	148,178	9,475,508
Shamokin & Lykens Val.	*	*	*	950,363
	248,493	10,879,038	148,178	10,425,871
Sullivan Region.				
St Line & Sul. RR. Co.	2,280	74,114	1,089	66,255
Total	696,219	28,387,268	419,641	30,566,188
Increase				
Decrease		2,178,920		

* Included in tonnage of the Philadelphia & Reading Railroad.

The above table does not include the amount of coal consumed and sold at the mines, which is about six per cent of the whole production.

Total same time in 1879	25,526,172 tons
" " " " 1880	27,408,527 "
" " " " 1881	"
" " " " 1882	"

The increase in shipments of Cumberland Coal over the Cumberland Branch and Cumberland & Pennsylvania railoads amounts to 214,522 tons, as compared with the corresponding period of 1883.

Belvidere-Delaware Railroad Report for the week ended December 13th:

	Week.	Year 1884.	Year 1883.
Coal for shipment at Coal Port (Trenton)	2,977	120,209	126,107
Coal for shipment at South Amboy	18,222	655,380	574,675
Coal for distribution	21,261	806,118	797,270
Coal for company's use	2,117	178,571	155,891
Total	44,577	1,760,278	1,653,943
Increase		106,335	
Decrease			

Comparative Statement of the Production of Bituminous Coal for the week ended December 13th, and year from January 1st:

Tons of 2000 pounds, unless otherwise designated.

	1884. Week.	1884. Year.	1883. Week.	1883. Year.
Cumberland Region, Md.				
Tons of 2240 lbs	47,996	2,768,595	34,588	2,412,686
Barclay Region, Pa.				
Barclay RR., tons of 2240 lbs	5,323	279,323	7,361	320,910
Broad Top Region, Pa.				
Huntington & Broad Top RR., of 2240 lbs	2,769	186,382	3,655	187,680
East Broad Top	*		439	41,321
Clearfield Region, Pa.				
Snow Shoe	3,843	175,513	6,031	248,206
Karthaus (Keating)	1,610	54,243		
Tyrone & Clearfield	70,105	3,021,591	66,812	2,738,227
Alleghany Region, Pa.				
Gallitzin & Mountain	7,708	385,874	11,114	435,229
Pittsburg Region, Pa.				
West Penn RR.	5,686	273,092	8,385	377,177
SouthwestPenn.RR.	1,731	119,512	3,004	118,961
Pennsylvania RR.	2,866	259,896	5,351	594,368
Westmoreland Region, Pa.				
Pennsylvania RR.	25,546	1,267,470	21,786	1,432,454
Monongahela Region, Pa.				
Pennsylvania RR.	2,465	152,838		
Total	177,648	8,944,329	168,526	8,907,219
Increase		37,110		

Comparative Statement of the Transportation of Coke over the Pennsylvania Railroad for the week ended December 13th, and year from January 1st:

Tons of 2000 pounds.

	1884. Week.	1884. Year.	1883. Week.	1883. Year.
Gallitzin & Mountain (Alleghany Region)	3,233	131,043	2,495	78,579
West Penn. RR.		24,865	4,593	116,112
Southwest Penn. RR	43,924	1,991,709	37,209	2,015,926
Penn. & Westmoreland Region, Pa. RR	5,477	192,618	4,359	211,450
Monongahela, Penn. RR.	1,271	69,867		
Pittsburg Region, Pa. RR.		136	1,125	21,897
Snow Shoe (Clearfield Region)	547	22,358	349	18,002
Total	64,452	2,432,596	50,130	2,461,966
Decrease		29,370		

FREIGHTS.

Coastwise Freights.

Per ton of 2240 lbs.

Representing the latest actual charters to December 18th.

PORTS.	From Philadelphia.	From Baltimore.	From Elizabethport, Port Johnston, South Amboy, Hoboken, and Weehawken.
Alexandria	.75@.90		
Annapolis			
Albany			
Baltimore	.58§		
Bangor			
Bath, Me	1.25	1.25	1.00
Beverly	1.30		1.00
Boston, Mass	1.25@1.35	1.25@1.50	1.00
Bristol	1.10		
Bridgeport, Conn.		1.10	
Brooklyn			
Buffalo, N. Y.			
Cambridge, Mass.	1.30‡		1.00
Cambridgeport	1.25‡		
Charleston, S. C.	75@.90	1.00	
Charlestown	1.25		1.00
Chelsea	1.25		1.00
City Point			
Com. Pt., Mass.	1.35		1.00
E. Boston	1.25		1.00
East Cambridge	1.35‡		1.00
E.Gr'nwich, R. I.	1.10		
Fall River	1.05		.70@.75
Galveston	1.85@2.00	2.00	
Gardiner, Me			
Georgetown, D.C.	.75@.90		
Gloucester	1.20@1.30		
Hartford			
Hackensack			
Hudson			
Lynn	1.35@1.50		
Marblehead			
Medford			
Millville, N. J.			
Milton			
Newark, N. J.			
New Bedford	1.00@1.10		.75
Newburyport			
New Haven		1.10	.60
New London			.70
New Orleans			
New-Berne			
Newport	1.15		.70@.75
New York	.85§	1.00	
Norfolk, Va	.60		
Norwich			.70@.75
Norwalk, Conn			.60
Pawtucket			
Philadelphia			
Portland, Me.	1.00*	1.25	
Portsmouth, Va.	.60		
Portsmouth, N.H.	1.35	1.35	1.10
Providence	1.05@1.10	1.15	.70@.75
Quincy Point	1.50		
Richmond, Va.	.75		
Rockland, Me.			
Rockport			
Roxbury, Mass.	1.25‡		
Saco			
Sag Harbor			
Salem, Mass.	1.35@1.50		1.00
Saugus			
Savannah	.95	1.00	
Somerset	1.10	1.20@1.25	
Staten Island		.90	
Trenton			
Troy			
Wareham			
Washington	.90		
Weymouth			
Williamsbg, N.Y.		1.05	
Wilmington, Del.			
Wilmington, N.C.		.90@1.00	
St. Thomas, W. I.			

* And discharging. † And discharging and towing. ‡ 3c. Per bridge extra. § Alongside. ‖ And towing up and down. ¶ And towing. ** Below bridge.

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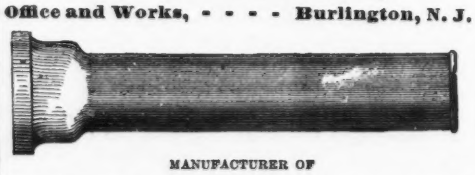

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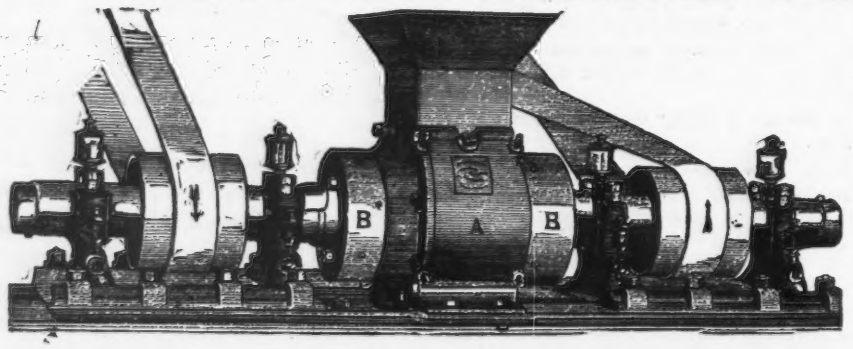

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